THE IRON TRADE REVIEW

VOLUME XXXIX CLEVELAND, MAY 3, 1906 NUMBER 18

UNJUST DEMANDS

RESULT IN SUSPENSION OF TRAFFIC ON THE GREAT LAKES.

Vessel Owners Will Fight For Principle of Freedom From Union Domination.—Probable Needs of San Francisco This Year Not Large.

The audacious attempt of a weakened union of unskilled land laborers to control highly paid skilled employes, of whom not one-tenth are members of any union, has resulted in the temporary paralysis of lake traffic. Owing to the rapid increase of the use of automatic unloading machinery, the number of laborers required on the docks is being gradually reduced and the union of longshoremen, in order to strengthen its position, has demanded that the vessel owners recognize its control of the mates. As the lake carriers two years ago established their position in opposition to their representatives, the captains, being members of any union, and as the mates are assistant captains, the attempt to force the mates into the union will be resisted. The vessel owners will fight for what they regard a very important principle, and will soon begin the operation of docks with non-union men, confident of the justice of their position and of their ability to break the strike. Very few of the mates have shown any disposition to sympathize with the strike. Fortunately, nearly all furnaces are prepared to continue in blast for from six to eight weeks, and some could run three months without an additional ton of ore. While the amount of ore shipped this month will undoubtedly be reduced, it does not seem probable that the manufacture of iron will be interfered with to any great extent. The final outcome of the strike promises to be a much more satisfactory relation of employers and employes.

The Needs of San Francisco. All the information obtainable in regard to conditions in San Francisco indicates that the demand for structural material will not be felt to any appreciable extent for several months. Insurance is now being adjusted, and it is not expected that any contracts will be made prior to July 1. About the only orders received to date are for small tonnages of merchant pipe and roofing which will be promptly filled. It is estimated that 10,000 tons of structural material cannot be used for a number of months, and as the total production of these shapes for this year will be about 1,500,000 tons, the demand growing out of the earthquake and fire can be easily met. A single modern mill with a capacity of 800 tons per day could soon roll all the shapes which will be required. Every necessary preparation is being made promptly to fill orders from the coast, and it is expected that American manufacturers will be very liberal in giving buyers time in which to make their payments. It is exceedingly doubtful whether foreign manufacturers would grant anything like as favorable terms as will be freely given by manufacturers of this country. This fact will undoubtedly have important influence in preventing the removal of the tariff on structural material. That proposition is being strongly opposed by California congressmen, and it is not at all likely to succeed.

Pig Iron Conditions. The pig iron market is active in New York and Chicago, but quiet in a considerable part of the territory between these two cities, especially in Pittsburg, where the only important transaction of the week was the contract by the Steel Corporation for the May surplus of Bessemer pig iron up to 20,000 tons to be manufactured by the Bessemer Association. Large foundry interests are inquiring for tonnages of considerable size in Chicago, including the leading harvester interest. The threatened strike of molders in Cleveland, which has been averted, has caused some hesitation of buyers in that city, and the same condition prevails in St. Louis.

Mills Can Not Operate. The scarcity of crude steel is still a marked feature. About 20 per cent of the plants of the American Sheet & Tin Plate Co. are idle on account of inability to obtain sheet and tin plate bars. The advanced price of $3.60 per base box for tin plate is not being closely adhered to. There is a decided improvement in the sheet business, especially in the west, and specifications on contracts are heavy.

Heavy Orders for Rails. The Tennessee Coal, Iron & Railroad Co. has taken orders for about 200,000 tons of open-hearth rails for delivery next year at $29. The decision to charge $29 for open-hearth rails will probably establish a differential of $1 over Bessemer rails, which are to be sold in 1907, as for a number of years past, at $28. As a number of makers of the latter will in a not far distant future produce open-hearth rails, it is understood that they regard with favor the establishment of this differential. Three large western steam roads have placed contracts for 100,000 tons for 1907 delivery. The St. Paul has ordered 10,000 tons; the Northwestern 50,000 tons, and the Northern Pacific 40,000 tons. Other lines to contract for 1906 shipments include the New York Central, 60,000 more, the Michigan Central 2,000 tons, the Boston & Maine 6,000 tons and the Nickel Plate 5,000 tons.

The Steel Bar Concession. The recent granting of the concession of $2 per ton on steel bars to agricultural implement manufacturers is causing considerable unfavorable comment, and the steel bar market is not considered as firm as it was previous to this action.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Pig Iron Market Very Quiet.—Corporation Takes Surplus Bessemer.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, May 2.

The market conditions in this district are in peculiar shape and while, as a general proposition, things may safely be said to be strong, there are several spots which are practically without life or transactions. Pig iron is one of those spots and aside from an agreement between the Bessemer Pig Iron Association and the Carnegie Steel Co., made Tuesday, according to the terms of which the corporation agrees to take all the May delivery Bessemer iron not disposed of by the association up to 20,000 tons for the month, the business during the past week has been next to nothing. A week ago a large independent steel interest bought heavily from valley furnaces. There are some few inquiries out, but none of large tonnages and the general impression is that the continued buying by the corporation is about all that is holding prices where they are. Two months ago it was stated that about all the Bessemer pig iron output of valley furnaces had been disposed of up to July 1, but since that time 40,000 tons has been sold at various times.

In some quarters there has been a scarcity of Bessemer ores and furnaces in this condition will undoubtedly be hard hit if the strike of dockworkers at lake ports is prolonged. The larger interests are amply provided with all grades of ore and it will be only the smaller independent interests who will be troubled to get the proper ores to make their regular mixtures.

Nothing definite has as yet been heard from San Francisco as to the requirements for rebuilding that city and it is not expected that actual contracts for large structures will be placed short of two or three months, as insurance adjustments have not been made and the business interests have not had time to get squared away after the shock. About the only emergency business from that district to be placed so far in Pittsburg has been 1,200 tons of small size merchant pipe and 5,500 tons of galvanized corrugated roofing, these orders having been placed respectively with the National Tube Co., and the American Sheet & Tin Plate Co., both constituent companies of the United States Steel Corporation.

The scarcity of semi-finished steel is becoming more marked every week, this applying to sheet bars, billets and slabs. An officer of the American Sheet & Tin Plate Co., is authority for the statement that 20 per cent of the sheet and tin plate mills of that company are not operating on account of inability to secure an adequate supply of sheet and tin plate bars.

Pig Iron.—The Carnegie Steel Co., on Tuesday of this week agreed to take the surplus production up to 20,000 tons, of the Bessemer pig iron of the Bessemer Pig Iron Association, at $17.25, valley, May delivery. While Bessemer and basic iron are both strong, foundry iron and gray forge iron are stationary. There has been practically no buying and an earnest offer for a good tonnage would undoubtedly result in shading quoted prices which are nominal. No. 2 foundry is quoted at $17, valley and gray forge $16.50 to $16.60, Pittsburg. Southern No. 2 is quoted at $14, but there has been no inquiry. We quote:

Bessemer Valley	$17.25 to 17.50
Bessemer, Pittsburg	18.10 to 18.35
No. 1 Foundry, Pittsburg	18.00 to 18.12
No. 2 Foundry, Pittsburg	17.60 to 17.85
Gray Forge, Pittsburg	16.50 to 16.60
Basic, Valley	17.00 to 17.20
Basic, Pittsburg	17.85 to 18.56

Ferro-Manganese.—For delivery during May, ferro-manganese, foreign, 80 per cent is quoted at $100 and for delivery before July 1 at $95. The scarcity of two months ago has almost entirely disappeared and there would be no difficulty in securing the material at prices quoted for these deliveries.

Steel Billets.—Bessemer steel billets are now quoted $27 to $27.50 Pittsburg and are scarce at that price. One lot mentioned last week was sold at $26 under stress where shipment to the regular consumer had been suspended. Sheet bars are very scarce and are held firmly at $28.

Skelp.—The inactivity of this market has resulted in a gradual decline during the past few weeks and prices since then have been shaded about $1 per ton. We quote as follows: Bessemer grooved, 1.57½c to 1.60c; sheared, 1.65c to 1.70c; basic grooved, 1.60c to 1.65c; sheared, 1.65c to 1.70c; iron skelp, grooved, 1.65c to 1.70c; sheared, 1.80c to 1.85c.

Hoops and Bands.—Mills are running almost exclusively on old business which is ample to keep them going for some time to come. New business is extremely light. Specifications against old contracts are very heavy, however, and this is looked upon as favorable. We quote:

Hoops, 1.90c in carload lots, and 2c on less than carload lots, bands, 1.50c base, half extras as per standard steel card. Prices f. o. b. Pittsburg.

Muck Bar.—On all pig metal muck bar we quote $29 to $29.50 and part scrap bar $27.50. Transactions have been very light.

Structural Material.—New business has been only fair in volume and nothing has been heard from San Francisco and nothing in the way of contracts is expected before July 1 and possibly later. The structural mills in this district are prepared to take care of the San Francisco business when it comes and as announced last week will give it the preference, treating it as emergency business. Some small structural business has been placed during the week, but it did not run up in tonnages. We quote:

Beams and channels, 15 in., and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles from 3 to 6 inches, inclusive, 1.70c; over six inches, 1.80c; universal and sheared plates, 6¼ inches and wider, 1.60c base.

Plates.—The steel car companies are urgent in their demands for delivery on specifications, but aside from this one industry, there has been nothing new to report for the week under review. There is a persistent report to the effect that the Pennsylvania lines are about to ask for bids on the construction of 20,000 to 23,000 cars for next year delivery, but this same subject was up some time ago and nothing was done with it. Since the placing of orders for plates for the new Detroit & Cleveland line steamer, no lake business has been placed, although considerable will be required for repair work due to the recent series of accidents, collisions, strandings etc., immediately after the opening of navigation. We quote:

Tank plate ¼ inch thick, 6¼ to 100 inches, 1.60c f. o. b. mill, Pittsburg. Extras are as follows per 100 pounds, boiler and flange steel plates, .10c; A. B. M. A. and ordinary firebox steel plates, .20c; still bottom steel, .30c; marine steel, .40c; locomotive firebox steel, .50c; all sketches excepting straight taper plates, varying not more than 4 inches, in width at ends, narrowest end not being less than 30 inches, .10c; complete circles, .20c. Plates in width over 100 inches up to 110 inches, .05c; over 110 inches up to 115 inches, .10c; over 115 inches up to 120 inches, .15c; over 120 inches up to 125 inches, .25c; over 125 inches, up to 130 inches, .50c; over 130 inches, 1.00c. Gauges under ¼ inch to and including

3-16 inch plates on thin edges, .10c; under 3-16 inch to and including No. 8, .15c; under No. 8 to and including No. 9, .25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Sheets.—What may be considered strictly new business has been light during the week under review, but the specifications against old contracts have been heavy. Among the first big orders to be received from the San Francisco district was that of 5,500 tons of corrugated roofing plates which has been booked by the leading interest and which will be rushed through as rapidly as possible, as the material is to be used in temporary reconstruction work. In both sheets and roofing the affected district will be given the preference despite the demands of regular consumers. This preference will amount to about eight weeks on delivery. We quote:

Black steel sheets, box annealed, cold rolled, one pass: Nos. 11-12, 2c; Nos. 13-14, 2.05c; Nos. 15-16, 2.10c; Nos. 17-21, 2.15c; Nos. 22-24, 2.20c; Nos. 25-26, 2.25c; No. 27, 2.30c; No. 28, 2.40c. Galvanized, Nos. 10-11, 2.35c; Nos. 12-14, 2.45c; Nos. 15-16, 2.55c; Nos. 17-21, 2.70c; Nos. 22-24, 2.85c; Nos. 25-26, 3.05c; No. 27, 3.25c; No. 28, 3.45c. Corrugated roofings, $1.70 per square for No. 28 painted, 2½-inch corrugated, $3.05 per square for No. 28 galvanized, 2½-inch corrugation. Quotations f. o. b. Pittsburg on large lots.

Merchant Bars.—Transactions in common iron bars during the week under review have been very light and far below the week previous in point of tonnage. We quote:

Common iron bars, 1.55c to 1.60c, Pittsburg in carload lots, 1.65c in less than carloads; for western shipment 1.50c base Pittsburg; Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c net; channels, angles, zees and tees, under 3 inches, 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds .10c advance, less than 1,000 pounds, of a size, .30c advance.

Merchant Steel.—By an authoritative source it is estimated that a majority of the big business with implement makers has been closed for the year beginning July 1 although there is still some to be done before that time. We quote:

Cold rolled and ground shafting, 50 per cent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.70c to 1.80c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.05c to 2.10c. The price of planished and machine straightened tire is 1.70c base half extras as below. Iron finished tire up to 1½ inch by ½ inch 1.65c base half extra tire list. Iron finished tire 1½ inch by ½ inch and over to be sold on regular bar basis of 1.50c base, half extra steel card.

Rails and Track Material.—The number of inquiries received by the local rail mills during the week were about the same as they have been from week to week although the amount of business closed has been small, including 5,000 tons for the Nickel Plate and 4,500 for the Louisville & Indianapolis Traction Co. The books for 1907 business have been opened at $28, the same as for several years past. The Illinois Steel Co., and Tennessee company have taken business for next year but none has been taken by local mills which still have some capacity for the present year after September. Light rails have taken a slight brace and are in better demand. We quote:

Fifty pounds and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; light rails, 16 pounds, $30; 20 pounds, $28.50 to $29; 25 to 45 pounds, $29; angle bars for standard sections, 1.50c; spikes, $2.05 to $2.10.

Tin Plate.—A considerable amount of new business has been placed during the past week and it is pretty generally understood that the new price of $3.60 per base box is not being adhered to, although this price is still quoted as the official. On account of the scarcity of sheet and tin bars about 20 per cent of the mills of the leading interest have been shut down, but the announcement is made that these mills are closed for no other reason.

We quote: $3.60 per base box, f. o. b. Pittsburg, 14 x 20 100-pound cokes, terms 30 days, less two per cent off for cash in ten days.

Merchant Pipe.—There has been a good demand for the small merchant sizes from the San Francisco district, general conditions are fairly good and a considerable tonnage is being booked but prices are very low, the extreme discount to the large trade being 81 and 5 per cent off. As far as can be learned none of the negotiations pending on pipe line goods have been closed although several of fairly good size have been under way for some little time past. We quote pipe consumers' carloads, with jobbers' carloads one point higher discount:

	Steel		Iron	
Consumer's Carloads	Black	Galv.	Black	Galv.
⅛ and ¼ inch	71	55	67⅛	51⅛
⅜ inch	73	59	69⅛	55⅛
½ inch	75	63	71⅛	59⅛
¾ to 6 inches	79	69	76	66
7 to 12 inches	74	59	71	55⅛
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch	64	52	60⅛	48⅛
½ to 4 inches	71	59	67⅛	55⅛
4½ to 8 inches	67	55	63⅛	51⅛
Double extra strong plain ends, ¼ to 8 inches	60	49	56⅛	45⅛

Boiler Tubes.—There has been no change worthy of particular mention. Locomotive boiler tubes are in very good demand, but in other branches of the trade the demand is only seasonable. On merchant boiler tubes, 22 feet and under, consumers' carloads, we quote as follows:

	Steel	Iron
1 to 1¼ inches	46	41
1¾ to 2¼ inches	58	41
2½ inches	60	46
2¾ to 5 inches	66	53
6 to 13 inches	58	41

Less than carload lots two points less.
2½ inches and smaller, over 18 feet, 10 per cent net extra.
2¾ inches and larger, over 22 feet, 10 per cent net extra.

Wire and Wire Nails.—This market has been running along as usual without change and although mills are now approaching the dull summer season, there has been no indication of a letup. Mills are operating full, new business is coming in at about the same volume as old business being turned out and mills are assured of full operation to July 1, at least. There has been no change in prices and we quote as follows:

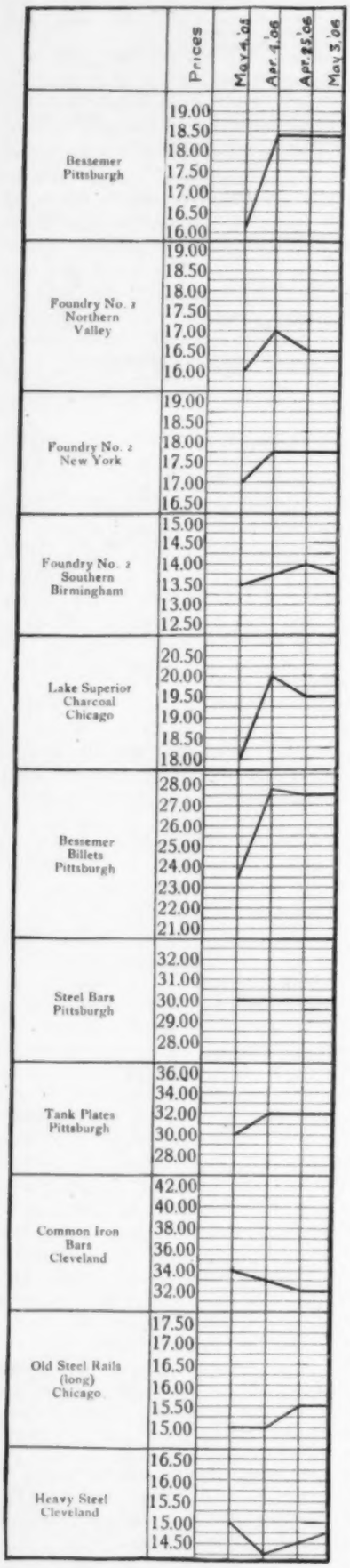
Wire nails, jobbers' carload lots, $1.85; retailers' carload lots, $1.90, and less than carload lots, $2; painted barb wire, $2 for jobbers in carloads; retailers in carloads, $2.05, and less than carloads, $2.15, with 30c for galvanizing; plain wire $1.70 to jobbers and $1.75 by carload.

Old Material.—There has been a slight improvement in scrap and several sales, while not for large tonnage but still indicating some action, have been made during the week. We quote: Pittsburg: Heavy melting stock, $15 to $15.50; old steel rails, rerollers, $15.50 to $15.75; No. 1 cast scrap, $15 to $15.50; cast borings, $8.75 to $9; bundled sheet scrap, $14; No. 1 railroad wrought, $17 to $17.25; No. 1 yard faggoting scrap, $17; low phosphorus scrap $18 to $18.50; wrought turnings, $11 to $11.50; busheling scrap $14 to $14.50; iron axels, $25 to $26.

Coke.—The coke market is still firm and we continue to quote standard Connellsville foundry coke $3 to $3.10 ovens, and furnace coke $2.80 to $2.90, for spot shipment. The estimated output of the Connellsville district for the week ending April 21 was 271,280 tons and for the lower Connellsville region 100,236.

According to the *Railway Age* the equipment of all mail trains of the Harriman line with all steel mail cars is under consideration.

PRICE CHART.



CHICAGO.

Heavy Sales of Rails.—Marked Activity in Pig Iron and Other Lines.

Office of *The Iron Trade Review*,
1164 Monadnock Block, May 1.

Contracts for nearly 200,000 tons of open-hearth rails for 1907 delivery have been booked by the Tennessee Coal, Iron & Railroad Co. since it advanced its price to $29 a ton. At the rate of production of 20,000 tons a month, which this company is now maintaining, the volume of business taken represents practically its entire output for 1907. The interests represented in the Bessemer rail association have not been as active in this respect as the southern company, although they have reaffirmed the $28 schedule and announced their readiness to take orders. Activity has marked every other branch of the iron and steel trade in Chicago, despite the strike among lake vessel men, iron molders and the structural iron workers. Large foundry interests have entered the market, including the International Harvester Co., whose requirements are said to range from 20,000 to 50,000 tons, American Steel Foundries, Grand Crossing Tack Co., Pullman Co., and others, who are vigorously besieging northern furnaces on their requirements for the last half for malleable, basic, charcoal and foundry grades. In structural lines, the Pennsylvania Steel Co. has closed contracts for 1,500 tons of bridge material, and the American Bridge Co. for 1,000 tons in new buildings. A large amount of new business has come up for consideration, variously estimated to range from 15,000 to 20,000 tons. That the United States Steel Corporation will take an active part in the rebuilding of San Francisco is evidenced by the despatch of a party of its representatives to the coast last week. An improvement is noted in sheets, mill prices being uniformly maintained on the basis of 2.40c Pittsburg for No. 28 gauge black, and 3.45c Pittsburg for galvanized. Tubular goods are active and prices are firm. The demand for universal plates is heavy, but sheared plates are slow. There is considerable activity in merchant steel, implement interests placing season contracts freely.

Pig Iron.—Buying of malleable and foundry irons is progressing at a favorable rate. Large consumers are the principal figures in the local market, their respective wants running into heavy tonnages. Among them is the International Harvester Co., which, while having bought only "filling-in" lots, is understood to be sounding the market on its larger requirement, said to range from 20,000 to 50,000 tons. The Pullman Co. is receiving prices on 1,000 tons of No. 2, 1,000 tons of No. 3, and 350 tons of silvery; the Moline Plow Co. is figuring on 3,000 to 5,000 tons of foundry grades, and the Grand Crossing Tack Co. is in the market for about 6,000 tons of basic. The American Steel Foundries has bought between 1,000 and 2,000 tons of basic for May and June delivery, but has postponed the purchase of several thousand tons additional on which it was figuring because of the high prices quoted. Considerable malleable iron has been sold in this market by furnaces in the Hanging Rock (Ohio) district on the basis of $18.30 Chicago, a competition which local furnaces have in part met. Prices are stiffer this week, most of the Ohio furnaces quoting 25 cents and upwards above this price, and local furnaces holding their schedule at $18.75 to $19 Chicago. Lake Superior charcoal has weakened in sympathy with this competition, and is now offered at $19.25 Chicago. The strike among the lake vessel men has precipitated an active buying movement of northern irons for the entire last half, many melters preferring to cover on the basis of $18.75 to $19 rather than take any chances of a shortage of iron later in the year as a result of the possible curtailment of the ore supply to lake furnaces. Southern irons remain firm at $14 Birmingham for No. 2 foundry, and practically all the tonnage booked is taken at this figure. Our quotations are as follows:

Lake Superior charcoal	$19.25 to 19.50
Northern Foundry No. 1	19.25 to 19.75
Northern Foundry No. 2	18.75 to 19.00
Northern Foundry No. 3	18.25 to 18.75
Northern Scotch Foundry	19.25 to 19.75
Ohio Strong Softeners No. 1	20.30
Ohio Strong Softeners No. 2	19.50
Southern Foundry No. 1	18.40 to 18.65
Southern Foundry No. 2	17.90 to 18.15
Southern Foundry No. 3	17.40 to 17.65
Southern Foundry No. 4	17.15 to 17.40
Southern No. 1 Soft	18.40 to 18.65
Southern No. 2 Soft	17.90 to 18.15
Southern Gray Forge	16.40 to 16.90
Southern Mottled	16.15 to 16.65
Southern Silveries (4 percent to 6 percent Silicon)	18.40 to 18.90
Jackson Co. Silveries, 8 to 10 percent Silicon	23.30 to 24.30
Alabama and Georgia Car Wheel	22.65
Malleable Bessemer	18.30 to 18.75
Basic Iron	18.40 to 18.85

Billets and Rods.—The chief transaction of the week was a sale of 1,000 tons of axle billets by a local mill to a western road, the price being $36 Chicago. Inquiry for forging billets is good, but the tonnage changing hands is light owing to the small amount of material available. The Inland Steel Co. has completed another 50-ton open hearth furnace, and will put it in operation within the next week or ten days. This will increase its output of steel to approximately 750 tons daily. Provision has been made for the erection of a sixth furnace, and it is expected, work on it will be commenced some time this year. There is a fair movement in wire rods. For the Bessemer class, the American Steel & Wire Co. has changed its price to $36 Chicago instead of $37, as before. Basic rods are held at $1 a ton above these.

Iron and Steel Bars.—Demand for bar iron has materially improved in

the last few weeks, several contracts of 1,000 tons and more having been closed by local mills in this period. While most of this tonnage is for delivery in the next 60 days, some buying has been done for shipments extending into the third quarter. The market is very firm at 1.66½c Chicago. Inquiry for steel bars is of an apathetic nature, only the smaller buyers now placing orders. We quote carload lots, Chicago delivery, as follows:

Bar iron, 1.66½c; soft steel bars and bands, 1.66½c half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 2.06½c base, full extras; old rail stock, 1.65½c. There is a good movement from local warehouses and jobbers' prices are firm. We quote bar iron, 2.10c full extras; soft steel rounds and squares, 3 inches and larger, $2 per 100 pounds base; flats, 2 inches to 4 inches by 1⅛-inch and larger, $2 per 100 pounds base; flats, 2 inches to 4 inches by 1⅛ inches and larger, $2,00 per 100 pounds base; flats, 4½ inches x 5 inches and 6 inches x 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half rounds, $2 per 100 pounds base; steel bands, $1.85 to $1.95 half extras; soft steel hoops, $2.30 to $2.40 full extras. Other sizes not mentioned above, $1.85 per 100 pounds base, plus half extras.

Sheets.—The weakness in sheets has wholly vanished, and for the business now coming forward the official schedule based on 2.40c Pittsburg for No 28 gauge black is firmly maintained. It is well nigh impossible to get deliveries on black within eight weeks, or on galvanized within ten to twelve weeks. Except in rare instances, jobbers are holding to the advanced schedule which went into effect a week ago. We have revised our prices, and quote mill shipments, Chicago delivery, as follows:

Nos. 8, 9 and 10, 1.86½c; Nos. 11 and 12, 1.91½c; Nos. 13 and 14, 1.96½c; Nos. 15 and 16, 2.06½c. Box annealed, Nos. 18 and 20, 2.26½c; Nos. 22 and 24, 2.36½c; No. 26, 2.41½c; No. 27, 2.46½c; No. 28, 2.56½c; No. 29, 2.71½c; No. 30, 2.81½c. Jobbers' prices on less than carload lots are as follows: No. 10, 2.20c; No. 12, 2.25c; No. 14, 2.30c; No. 16, 2.40c; Nos. 18 and 20, 2.55c; Nos. 22 and 24, 2.60c; No. 26, 2.65c; No. 27, 2.70c; No. 28, 2.75c; No. 30, 3.20c.

Quotations on galvanized sheets, carload lots, mill shipments, are as follows: Nos. 10 and 11, 2.46½c to 2.51½c; Nos. 17-21, 2.81½c to 2.86½c; Nos. 22-24, 2.96½c to 3.01½c; Nos. 25-26, 3.16½c to 3.21½c; No. 27, 3.36½c to 3.41½c; No. 28, 3.56½c to 3.61½c; No. 29, 3.81½c to 3.86½c; No. 30, 4.06½c to 4.11½c. From store, galvanized sheets, less than carload lots, are quoted as follows: Nos. 10 to 20, 3c to 3.10c; Nos. 22 and 24, 3.15c to 3.25c; No. 26, 3.35c to 3.45c; No. 27, 3.55c to 365c; No. 28, 3.75c to 3.85c; No. 30, 4.95c to 5c.

Merchant Steel.—There is an excellent demand for plow steel, toe calk, and kindred materials, western implement manufacturers covering freely for their year's requirements commencing July 1 next. Prices are firmly maintained, mill shipments, Chicago delivery, being as follows:

Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c to 2.40c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c base; plow steel, 2.20c and upward, according to quality; toe calk steel, 2.21c; railway spring, 1.86½c. Cold rolled shafting, 50 per cent off in carload lots and 45 per cent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and up.

Plates.—The local situation is without noticeable change. Specifications for universal plates are heavy, but are light on sheared material. Deliveries of the latter can be obtained within four weeks, but the last quarter is the best that can be done by manufacturers of the former. Prices are without change, carload lots, mill shipments, being quoted as follows:

Tank steel, ¼ inch and heavier, up to 100 inches wide, 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base; all full extras. Plates 3-16 inch thick, $2 extra; gauges, 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Store prices are very firm. We quote from local stocks; tank steel ¼ inch and heavier, up to 72 inches wide, 2c to 2.10c; 72 inches to 96 inches wide, 2.10c to 2.20c; 3-16 inch up to and including 60 inches wide, 2.10c to 2.20c; 3-16 inch 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.15c to 2.25c; flange steel, 25c extra; heads, 25c extra.

Structural Material.—By the strike of the structural iron workers which was inaugurated today, work on jobs in Chicago aggregating a total requirement of 50,000 tons of steel, has temporarily ceased. As most of these contracts were in the hands of independent contractors, and as the American Bridge Co. has been involved in a strike with its employes for some time, there exists a complete tie-up of the structural steel end of the building industry in this city. Demand for material for erection in other parts of the country, however, is brisk. The Pennsylvania Steel Co. has closed a contract for 1,200 tons of erected bridge work for the Lake Erie & Western, and for 300 tons of bridge material for the Lake Shore & Michigan Southern. Contracts have also been placed with the American Bridge Co., for the erection of the Peavey Elevator, Duluth, 800 tons; and an office building in Bellingham, Wash., 200 tons. In addition, the company is preparing bids on the new postoffice to be built in Los Angeles, which will require 1,800 tons; a refrigerating plant for the Schlitz Brewery, Milwaukee; a car erecting shop for the Illinois Central Railway at Burnside, Ill.; the Sixty-eighth street pumping station, Chicago, and several smaller jobs. All bids have been rejected for the erection of the Maison Blanche department store at New Orleans, and the project will be re-advertised. Nothing new has developed in connection with the Kesner building, Chicago Musical College and Chicago Telephone building, the total requirements of which amount to 5,000 tons. Prices are firm, and without change, as follows:

Beams and channels, 3 to 15 inches, inclusive, 1.86½c; angles, 3 to 6 inches, 1.86½c; angles, larger than 6 inches, one one or both legs, 1.96½c; beams, larger than 15 inches, 1.96½c; zees, 3 inches and over, 1.86½c; tees, 3 inches and over, 1.91½c, with the usual extras for cutting to exact lengths, punching, coping, bending, or other shop work.

Quotations on lots from store are as follows: All angles three inches and larger, including six inches, $2.25 per 100 pounds base; angles over six inches, $2.35 per 100 pounds base; tees, three inches and larger, $2.30 per 100 pounds base; beams, three inches to fifteen inches, inclusive, $2.25 per 100 pounds base; beams, eighteen inches and larger, $2.35 per 100 pounds base; channels, three inches and larger, $2.25 per 100 pounds base.

Rails and Track Material.—Some months earlier than usual, rail manufacturers have opened their books for 1907 tonnage. The Tennessee Company has already closed contracts aggregating 200,000 tons for this delivery, all of it being taken at the advanced price of $29 a ton. It is understood that this company is now producing open-hearth rails at the rate of 20,000 tons a month. Western mills have not yet become active in securing 1907 business, neither the Illinois nor the Carnegie Steel Co. reporting orders for that year. Several small contracts have been let in the week under review for 1906 shipment, including 500 tons for the Milwaukee Electric Railway, which went to the Carnegie Steel Co., and 2,000 tons of high T and girder rails which was closed by the Pennsylvania Steel Co.,

for a western trolley line. Track supplies and light rails continue in the same active demand as formerly.

We quote, standard sections, f. o. b. mill, open-hearth rails, $29; Bessemer, $28; light rails, Bessemer steel, 30 to 45-pound sections, $27 to $28, 25-pound, $28 to $29; 20-pound, $29 to $30; 16-pound, $30 to $31; 12-pound $31 to $32, and light sections down to 8-pound, $38 to $40, all f. o. b. mill. Track supplies are quoted as follows: angle bars, 1.50c to 1.75c; spikes, (for quick shipment) 2.20c to 2.25c; (for forward deliveries) 2.05c to 2.10c; track bolts, 2.65c to 2.75c, base square nuts.

Cast Iron Pipe.—Carload business predominates in the week's sales, municipal transactions of any moment being conspicuous by their absence. Inquiries were received from the municipalities of Muskegon Heights, Mich., and Mayville, Wis., for between 500 and 600 tons each, the lettings for which will be made in a few weeks. Prices are without change, as follows: 4-inch water pipe, $31 Chicago; 6, 8, 10 and 12-inch, $30; larger sizes, $29.50; gas pipe, $1 extra.

Merchant Pipe.—Specifications and new tonnage are of good volume. Prices are firm and the trade outlook is good. We quote ¾ to 6-inch black steel pipe, 78:35 per cent discount from list, and galvanized, 68:35 per cent discount. From store, minimum quotations are 76½ to 77 per cent discount on the base sizes, ¾ to 6-inch black steel pipe.

Boiler Tubes.—Local jobbers report an excellent movement from warehouse stocks. Deliveries from mills are prompt and to full contract requirements. Prices are uniformly maintained. We quote official discounts as follows:

	Steel	Iron	Seamless
1 to 1¼ inches	40.35	37.35	53.00
1¼ to 2¼ inches	54.35	39.35	40.00
2¼ inches	56.35	44.35	43.00
2¼ to 5 inches	62.35	51.35	
Up to 4¼ inches			50.50
6 to 13 inches	52.35	37.35	

Less than carload lots, from store, as follows:

	Steel	Iron	Seamless Steel
1 to 1¼ inches inclusive	40	35	42½
1¼ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	30
2¾ to 5 inches, inclusive	60	47½	42½

Wire Products.—No diminution is noted in the demand for fencing and nails. Jobbers and dealers in all sections of the country are actively replenishing their stocks, the enormous demand of the last two months having very generally cleaned them out of material. The manufacturing trade is now buying very freely, especially of materials entering into street railway construction. All prices are firm and uniformly maintained. We quote carload lots to jobbers, as follows:

Wire nails, $2; painted barbed wire $2.15; galvanized barbed wire, $2.45; smooth annealed wire, $1.85; smooth galvanized wire, $2.15; polished staples, $2.15; galvanized staples, $2.40. Carload lots to retailers, 5 cents higher than above prices; less than carload lots, 15 cents higher.

Coke.—Supplies of coke continue plentiful and prices are soft. Western consumers generally are well covered and are not buying very heavily. Demurrage coke is again being offered, prices quoted for same ranging from $5 to $5.25 Chicago on standard 72-hour brands. For forward deliveries Connellsville ovens are asking for foundry material from $275 to $3.25 ovens. Local by-product is quoted from $5.80 to $5.90 Chicago.

Old Material.—There are no developments of an important nature in the scrap market this week. Current demand is of light proportions, being limited to "filling-in" lots to steel foundries, bar iron mills and open-hearth plants. Prices are well maintained, old steel rails, railroad wrought and dealer's forge being fractionally higher this week. The only new list out is that of the Chicago & Northern railway, which approximates 1,500 tons. Local dealers do not anticipate any effect on the local market by the large amount of scrap that will be offered from the San Francisco wreck, believing that little, if any, will be offered for sale here. We have revised our prices, and quote as follows; gross tons being given in the first paragraph:

Old Steel Rails (4 feet and over)	$15.75 to 16.25
Old Steel Rails (less than 4 feet)	14.75 to 15.25
Old Car Wheels	18.50 to 19.00
Old Iron Rails	21.00 to 21.50
Relaying Rails, subject to inspection	27.00 to 27.50
Heavy Melting Steel	13.50 to 14.00
Mixed Country Steel	11.50 to 12.00

We quote as follows net tons:

No. 1 R. R. Wrought	$14.75 to 15.25
No. 2 R. R. Wrought	14.25 to 14.50
Shafting	16.00 to 16.50
Dealers' Forge No. 1	12.50 to 13.00
Wrought Pipe and Flues	10.50 to 10.75
No. 1 Cast, 150 pounds and less	13.25 to 13.75
No. 1 Mill	9.50 to 9.75
No. 1 Busheling	10.00 to 10.50
No. 2 Busheling	9.50 to 10.00
Country Sheet	8.00 to 8.50
No. 1 Boilers Cut	10.00 to 10.50
Boiler Punchings	12.00 to 12.50
Iron Car Axles	22.00 to 22.50
Steel Car Axles	18.00 to 18.75
Iron Axle Turnings	10.50 to 11.00
Cast Borings	8.50 to 8.75
Mixed Borings, etc.	8.50 to 8.75
Machine Shop Turnings	10.75 to 11.00
Railroad Malleable	13.50 to 14.00
Agricultural Malleable	12.50 to 13.00
Stove Plate and Light Cast Scrap	10.50 to 11.00
Old Iron Splice Bars	16.50 to 17.00

B. Nicoll & Co., 59-61 Wall street, New York city, dealers in scrap iron and steel, and other metal products, have established an office at 1722 First National Bank building, Chicago, where they will do a local brokerage business in scrap, pig iron, coal and coke, etc. H. W. Rolfe, formerly with R. M. Cherrie & Co., Chicago, will be the western manager, and will have associated with him his brother, R. T. Rolfe.

CLEVELAND.

Furnaces Well Prepared for Strike on Lakes.—Pig Iron Inquiries Heavy, with Foundry Troubles Settled.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, May 2.

Iron Ore.—The strike of the longshoremen's union, which became effective May 1, has practically shut down the movement of ore and is the dominating feature of the present situation. Although efforts at settlement were repeatedly made, this outcome of pending difficulties had been foreseen and ore had been rushed from docks to furnace yards for the past six weeks or two months. This is shown by the fact that while ore on lower lake docks April 1, 1905, amounted to 3,400,000 tons, April 1, 1906, it was considerably less, about 3,000,000 tons. May 1, 1905, it was 2,271,631 tons, and May 1, 1906, was well under this figure, being in the neighborhood of 2,000,000 tons. In the Cleveland district, a canvass of the situation shows that almost without exception furnaces are stocked with enough ore to run at least a month, while a number can hold out twice that long. In most instances the Steel Corporation furnaces are in good shape. There may be some difficulty in securing just the grades of ore desired, but furnaces generally will continue to operate with little embarrassment for a much longer time than the strike is now expected to last. A sale of 30,000 tons of ore is noted during the week. Prices continue unchanged on the basis of $4.25, Old Range Bessemer.

Pig Iron.—A continued inquiry of good proportions is reported and sales aggregate a very fair tonnage. Threatened difficulties with molders May 1 had a restraining influence on certain foundrymen, but now that it is settled that there is to be no strike in this line a number of pending inquiries will doubtless develop business. Foundry interests are generally buying for the third quarter; some few are covering their scattered needs for the remainder of the second quarter and there is an occasional buyer through the second half. Prices continue about on the basis of $16.50 valley furnace, and $17.00 delivered Cleveland, though there is considerable variation from these figures. Some interests are getting as high as $17.00 valley for their iron and on the other hand there are reports that this figure is being shaded for local delivery. Southern irons are selling to some extent, though the price is almost prohibitive. Basic and Bessemer continue in good demand at unchanged

prices. Foundry interests stocked heavily on coke about the time the coal strike became effective and as a result are not buying to any great extent. The market is distinctly quiet, with prices slightly lower than a week ago. We quote as follows, f. o. b., Cleveland:

Bessemer	$18.10 to 18.35
No. 1 Foundry	17.50 to 17.75
No. 2 Foundry	17.00
No. 3 Foundry	16.50 to 16.75
No. 2 Southern	17.85 to 18.10
Gray Forge	16.35 to 16.85
Gray Forge, Southern	15.85 to 16.35
Lake Superior charcoal	19.50 to 20.00

Finished Materials.—A lessened demand for structural materials is noted. Old contracts are being filled and the influence of recent increases in production is being felt. Sheets are in brisk demand. Bar iron interests are now united on the quotation of 1.50c Pittsburg. Agitation over the recent steel bar arrangement with heavy users among the implement makers will not down, though it is understood that the price is now being held at 1.50c, the original figure. There is an occasional inquiry for rails from traction interests, but no orders of any size are reported. Billets are practically out of the market, consumers stating that they cannot use them at present high quotations.

Old Materials.—A slightly improved tone is reported with some business in heavy melting steel and railroad scrap. In a few instances prices are advanced. We quote, Cleveland delivery, as follows:

Old iron rails	$21.00 to 22.00
Old steel rails (over 6 feet)	16.50 to 17.00
Old steel rails (under 6 feet)	16.50 to 17.50
Old car wheels	16.50 to 16.75
Steel boiler plate	12.00 to 13.00
Steel axles	19.00 to 20.00
Malleable iron (railroad)	14.50 to 15.00
Malleable iron (agricultural)	12.50 to 13.00
Heavy steel	14.75 to 15.25
Country mixed steel	13.00 to 13.50

We quote net tons, as follows:

No. 1 R. R. wrought	15.50 to 16.00
No. 1 busheling	12.50 to 13.00
No. 1 machine cast	13.25 to 13.70
Iron axles	22.00 to 23.00
Axle turnings	11.00 to 12.00
Wrought turnings (free from cast)	9.50 to 10.00
Grate bars	9.50 to 10.00
Pipes and flues	11.50 to 12.00
Tank iron	10.50 to 11.00
Hoop and band iron	7.50 to 8.00
Sheet iron	6.50 to 7.00
Wrought drillings	9.50 to 10.00
Stove plate	10.00 to 10.50
Cast borings	7.50 to 8.00

CINCINNATI.

Views of Sellers Stronger, But there is Little Increase in Business.

May 1, 1906.

Pig Iron.—There has been no material increase in the volume of business the past week and no change in prices has occurred. Southern iron in a general way is steady at $13.75 to $14.00 Birmingham, although in a few exceptional instances lower prices have been made. In northern iron competitive sales have been made at $16.00 for No. 2 foundry at furnace and this is regarded as minimum in southern Ohio. We learned of one transaction involving 1,000 tons which was made on a basis of $15.75 for No. 2 foundry and $16.25 for No. 1. It is also reported that a large consumer took 6,000 tons of southern iron for last half delivery at $14.00 Birmingham. Trade sentiment appears to favor the view that there is enough current business to maintain prices at about the present level and that should active buying commence in the very near future, furnaces would be inclined to book considerable tonnage without seeking to advance prices. It is argued that the present level of prices is quite satisfactory and that it would be better to hold the market where it now is than to try to materially advance quotations. The trade seems to accept the present basis of values as normal under existing conditions. In the past two weeks views of furnaces and selling agencies have grown stronger without any material change in quotations. The amount of inquiry indicates more interest in the market and the purchasing agent of a large implement manufacturing interest was a caller on the sales agencies in this city last Saturday. In some quarters there is belief that prompt shipment iron for May and June is likely to be a feature. We quote f. o. b. Cincinnati:

Southern Foundry No. 1	$17.25 to 17.50
Southern Foundry No. 2	16.75 to 17.00
Southern Foundry No. 3	16.25 to 16.50
Southern Foundry No. 4	15.75 to 16.00
Southern Foundry No. 1, soft	17.25 to 17.50
Southern Foundry No. 2, soft	16.75 to 17.00
Gray Forge	14.75 to 15.00
Northern Foundry No. 1	17.65 to 18.15
Northern Foundry No. 2	17.15 to 17.65
Northern Foundry No. 3	16.65 to 17.15
Jackson County Silvery, 8 per cent	21.15 to 21.65
Southern Charcoal	22.75 to 23.25

Finished Material.—The market is fairly active and steady with no change in prices. Jobbers report a good demand and for some descriptions it is difficult to obtain reasonable deliveries.

We quote: steel bars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets, No. 10 and No. 12, in car lots are 2.58c. We quote black sheets, No. 27 at 2.40c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.85c; No. 27, 2.75c; No. 16, 2.35c; No. 14, 2.25c; No. 12, 2.15c. Tank plates are firm and sell out of store at 2 to 2.10c for ¼-inch and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.35c from stock and angles at 2.10c to 2.15c for base sizes.

In merchant pipe trade is fairly active and there is considerable competition, but prices are not quotably changed. We quote f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts)

	Steel Pipe		Guaranteed Wrought Iron Pipe	
	Black Per cent	Galv. Per cent	Black Per cent	Galv. Per cent
⅛ and ¼ inches	69.7	53.7	....	....
⅜ inch	73.5	61.3	....	....
½ inch	73.7	61.7	....	....
¾ to 6 inches	77.7	67.7	....	....
7 to 12 inches	72.7	57.7	....	....

Coke.—There is no change in the foundry coke situation and prices are steady, but there is practically no business being done. In furnace coke there is some inquiry for second half of the year delivery and quotations are mainly on a sliding scale based on a $1.65 to $1.70 for $9.00 pig iron with a range of 16 2-3 to 20 per cent for each advance of $1.00 per ton on pig iron. Prices in the leading coke producing districts are as follows:

Wise County, Va. Furnace Coke prompt shipment	$2.50 per ton
Wise County, Va. Foundry Coke prompt shipment	3.00 to 3.25 per ton
Pocahontas Furnace Coke prompt shipment	$2.25 to 2.50 per ton
Pocahontas Foundry Coke on contracts	2.75 to 3.00 per ton
Connellsville Furnace Coke prompt shipment	2.50 per ton
Connellsville Foundry Coke prompt shipment	3.00 to 3.25 per ton
New River Foundry Coke on contracts or prompt shipment	3.00 to 3.25 per ton
New River Furnace Coke, prompt shipment	2.50 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 per ton on $9.00 pig iron, plus 17 per cent of the advance on pig iron above $9.00 Birmingham

Old Material.—The undertone to the market is steady to firm but consumptive demand is quiet. We quote f. o. b. Cincinnati:

Old No. 1 railroad wrought, net tons	$14.00 to 14.50
Cast machine and foundry, net tons	12.50 to 13.00
Old iron rails, gross tons	20.00 to 20.50
Old steel rails, gross tons	15.50 to 16.00
Old short lengths, gross tons	16.00 to 17.00
Old iron axles, net tons	22.00 to 23.00
Stove plate, net tons	10.00 to 10.50
Wrought turnings, net tons	9.50 to 10.00
Cast borings, net tons	7.00 to 7.50
Car wheels, net tons	16.00 to 16.50

NEW YORK.

Good Volume of Buying in Pig Iron Market but Prices Somewhat Ragged.—Break in Price of Basic.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., April 30

April 30.

Pig Iron.—The market has shown more activity during the past few days than has been perceptible for many weeks. The tonnage sold in both foundry and basic has been large, but prices are no better than ragged. Regular customers who require moderate quantities of metal of standard brands have been willing to pay full prices, but whenever large tonnages have been under consideration hints of shading have been persistent. A week ago No. 2 New York foundry was sold in rather large quantities in New

England at $18.50, delivered, which effectually shut out competitors from the southern field. For a few days iron could be bought at a lower price in Boston than in Philadelphia. Since then this competition has extended west of the Hudson river, and at the present moment it is difficult to tell precisely where the market "is at." Sales of basic in the local market during the week will probably reach a total of between 25,000 and 35,000 tons, of which 10,000 tons is shipped from Virginia and the remainder from eastern furnaces. For the first time in many months prices of basic dipped slightly, a matter of more than passing interest. Several large blocks of basic are still pending. In foundry grades there has been the usual taking of small lots for prompt delivery and also some purchase of round lots. Machinery and pump makers have been the chief buyers. The General Electric Co. is in the market for from 7,000 to 9,000 tons of low silicon, high silicon and high phosphorus grades, requirements which it is generally expected will be filled by New York furnaces. Producers in the anthracite region are still blowing out furnaces, but the strike situation, although as grave as at any time since negotiations began, does not seem to frighten anybody. Large consumers have had too many offers of supplies to worry needlessly. The following are prices at tidewater:

Northern No. 1 Foundry	$18.25 to 19.00
No. 2 Foundry	17.75 to 18.50
No. 2 Plain	17.50 to 18.00
No. 1 Southern Foundry	18.00 to 18.50
No. 2 Southern Foundry	17.50 to 18.00
No. 3 Southern Foundry	16.75 to 17.25
No. 4 Foundry	16.50 to 17.00

Certificates and Warrants.—Trading in pig iron warrants and certificates on the New York Produce Exchange during the week has been almost at a standstill. The market was exceedingly dull, and apparently no one felt inclined to buy at any price. There were no sales. Today's quotations at the New York Produce Exchange were as follows:

Standard Foundry Contracts.

	Bid.	Asked.
Spot	17.30	....
May	17.40	....
June	17.50	....
October	17.25	....

Foundry Warrants.

	Bid.	Asked.
Cash	16.55	....
May	16.25	....

Finished Iron and Steel.—The most interesting topic of conversation among steel men during the week has been the probable demand for material for rebuilding San Francisco. Although there have been many rumors, it is still too early to consider definite plans. It is generally believed that the mills of the country will have no difficulty in meeting all requirements which may be made upon them. In the local trade several projects are held up by reason of the stringency in the money market. This difficulty antedates the San Francisco disaster, but the enormous shipment of currency to the Pacific coast has not tended to ease the situation. A large business in structural steel is still pending, but the orders of the week have been individually small. Rail business for the next calendar year will begin unusually early this year. As a rule the bookings do not begin until the fall, but it is probable that a large share of the 1907 output will be placed during the summer. Now that the chief producers of Bessemer rails have decided definitely that the price, $28 per ton, will prevail for another twelve months the only restraining influence has been removed. The Chicago, Milwaukee & St. Paul is in the market for 150,000 tons and the Tidewater railroad for nearly 40,000 and other roads are inquiring for smaller tonnages for delivery in 1907. Sales for delivery during the current year include 4,500 tons taken by the Louisville & Indianapolis Traction Co. and several thousand tons to various electric roads. Plates are in very satisfactory demand, makers report that the call for material used in structural work is urgent and that most producers are from four to six weeks behind the order books. There has been fair buying of bar iron and the market remains fairly steady.

The following are prices at tidewater: angles, 3 to 6 inches x ¼ inch and heavier, 1.84½c; beams, 3 to 15 inches, 1.84¼c; tees, 3 x ¼ inch and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine boiler, 2.41½c; refined iron bars, 1.64½c to 1.74½c; soft steel bars, 1.64½; sheets, No. 28 black, 2.40c.

Old Materials.—The demand continues to improve slightly and prices are firmer for all varieties of scrap, without showing any noticeable advance. Heavy melting steel scrap seems to get most attention, a sale of 900 tons to a mill in eastern Pennsylvania being reported. There has been considerable buying of heavy cast scrap for local foundries. Wrought railway scrap sales amounted to about 1,500 tons and one buyer took 100 tons of heavy iron car axles. The following are prices approximately f. o. b. tidewater.

Old iron rails	$21.00 to 22.00
Old steel rails, long lengths	14.50 to 15.00
Old steel rails, short pieces	14.25 to 14.50
Relaying rails	24.00 to 25.00
Old car wheels	17.00 to 18.00
Old iron car axles	26.00 to 27.00
Old steel car axles	19.00 to 19.50
Heavy melting steel scrap	14.50 to 15.00
No. 1 railroad wrought scrap	16.50 to 17.00
Iron track scrap	16.50 to 17.00
Wrought pipe	12.50 to 13.50
Cast borings	10.00 to 10.50
Wrought turnings	13.50 to 14.00

PHILADELPHIA.

Feeling is Optimistic.—Basic and Low Phosphorus Very Scarce.

May 1.

Pig Iron.—April proved a month of unusually large purchases, but May will exceed it, judging by present indications. Notwithstanding the shock to financial interests from the San Francisco fire and the confused condition of affairs in both the anthracite and bituminous coal regions, which has led to the blowing out of still more furnaces, the feeling among producers is increasingly optimistic. This is based on the large orders placed during the past week, mostly for the second and the three-quarters, and the constant inquiries. Basic and low phosphorus are so scarce that they may almost be said to have been eliminated from the market. A large New England interest is in the field for 10,000 tons of malleable, and other large consumers are negotiating for amounts of all grades varying from 5,000 to 20,000 tons. Many furnaces which earlier in the year sold up considerably beyond their capacity, are sadly behind in their deliveries. This fact and the insistence by consumers upon prompt delivery, and even anticipation of orders, if possible, show that there are no stocks on hand among melters, and that business is bound to be large for the third quarter at least. Prices have remained practically unchanged in the face of this demand, as there is no disposition to make them up unduly. They may be quoted as follows:

No 1X Foundry	$19.25 to 19.50
No. 2X Foundry	18.75 to 19.00
No. 2 Plain	18.25 to 18.50
Standard Gray Forge	16.75 to 17.00
Basic	17.90 to 18.15
Low Phosphorus	25.00 to 26.00
Southern No. 2X	18.75 to 19.00

Finished Material.—Structural material leads in activity, but nearly all lines are very busy and show an improving tendency. Estimates as to the amounts of new business likely to come from San Francisco have been modified considerably by discussion of the situation there, but without this the mills have all they can do for many months to come. There has been no change in prices, which may be quoted as follows: Beams, channels and angles according to specifications, 1.83½c to 2c; refined iron bars, 1.63½c to 1.73½c; steel bars, 1.63½c to 1.73½c; plates, 1.73½c. to 1.83½c.

Old Material.—While the general tone of the market is stronger than it was a few weeks ago, complaint is made

that the mills are not buying as much as they would naturally be expected to. Still better prices are looked for before long, in keeping with the general situation in the iron and steel trade. Half a dozen price changes are made in the following quotations:

Old steel rails	$17.00 to 17.25
No. 1 steel scrap	16.75 to 17.25
Old steel axles	20.50 to 21.00
Old iron axles	26.50 to 27.00
Old iron rails	21.00 to 22.00
Old car wheels	16.75 to 17.25
Choice scrap, R. R. No. 1 wrought	20.50 to 21.00
No. 1 yard scrap	18.25 to 19.20
Machinery scrap	15.75 to 16.25
Low phosphorus scrap	20.50 to 21.00
Wrought iron pipe	14.50 to 15.00
No. 1 forge fire scrap	15.50 to 16.00
No. 2 forge fire scrap, ordinary	10.50 to 11.50
Wrought turnings	13.75 to 14.25
Axle turnings, heavy	14.50 to 15.00
Cast borings	10.25 to 10.75
Stove plates	12.25 to 12.75

ST. LOUIS.

Uncertainty on Account of Threatened Strike of Molders.

April 30.

Conditions are somewhat unsettled on account of the threatened molders' strike. While it does not appear to be assuming such general proportions in this territory as in the east, still it has caused a hesitancy in the market and foundries are waiting to see what the developments are before placing orders. Only developments in the next few days can solve the situation. The molders insist they will walk out unless their demands are met. The foundries, on the other hand, declare they will not meet the demands and that there will be no strike.

In any event, the market is temporarily tied up. There was very little buying last week, though inquiries are better. If the molders do not go out, the market, in all probability, will be firmer than ever, and some good orders will be booked. It is a known fact that stocks are all running low. On account of the small volume of business there was a tendency again to cut the price of pig iron, but this was confined to off grades and to small orders by some of the smaller houses. Thirteen seventy-five is reported done. None of the larger concerns are reported to have gone under the price of $14 for southern No. 2 which was agreed upon by leading interests two weeks ago.

Coke remains quiet, with little demand. The price runs from $2.90 to $3.25 at Connellsville, depending upon the grade.

Iron quotations, including the freight rate of $3.50 to East St. Louis, range as follows:

Southern No. 1	$18.00 to 18.50
Southern No. 2	17.50 to 18.00
Southern No. 3	17.00 to 17.50
Southern No. 4	16.75 to 17.25
Gray Forge	16.50 to 17.00

Finished Material.—No depression is felt in the market for building materials on account of the fact that labor conditions are always more or less unsettled on the first of May. Little fear is expressed that any of the building operations will be tied up on account of strikes. Contractors are going ahead with their work with perfect assurance. The contract for the new syndicate building, 16 stories high, at Tenth and Olive streets, has been let to the Hill O'Meara Construction Co., which has closed the contract with the Jones & Laughlin Steel Co. for the steel, which will be 6,000 tons.

The James Black Contracting Co. has let the contract for the steel for the 18-story Augusta building at Eighth and Pine streets, to the Brown-Ketchum Iron Works of Indianapolis. This calls for 2,000 tons. Contractors generally report inability to get prompt shipments from Pittsburg, all of them being behind on their orders. The Republic Steel & Iron Co. reports that it is from one to three weeks behind, and has had to turn down some spike orders for small sizes.

There is a much better demand for steel than for iron bars. Many small jobbers have decided not to carry two piles of material, but will carry steel only and order iron when it is specified.

BIRMINGHAM.

Good Demand for Pig Iron and Prices Are Firm.

Birmingham, Ala., May 1.—There is a good demand for pig iron in the southern market and the production, which is yet somewhat off, is finding a ready sale. Prices are firm, $14 being asked for No. 2 foundry. The shipments are steady. The home consumption is heavy, the various plants using iron in their daily operation working steadily and needing a large quantity of iron. There will be but little improvement in the production in this district for three weeks at least.

Announcement is made that the Shelby Iron Co. will blow in its furnace at Shelby on charcoal just as soon as enough charcoal can be accumulated to last a while. It may be thirty or sixty days before the charcoal can be secured. The Shelby company has declared a dividend of five per cent. This company is practically a closed corporation. One furnace is working on coke iron and is finding a ready sale for every ton manufactured. There is no charcoal iron being manufactured in Alabama at present and the product is in good demand and at good prices.

May Build New Stack.—It is rumored that the Detroit Iron & Steel Co. is to erect another stack at Zug Island, doubling the present capacity of its plant. The stack now operating was built in 1903; its annual capacity is about 100,000 tons.

Metal Market

NEW YORK.

Pig Tin.—Prices have continued their unprecedented upward progress, although at today's close figures showed a slight reaction. The following are today's quotations: Spot, 39⅞ to 40; May, 39.50 to 40; June, 39¼ to 39¾; London, £183 10s and £177; arrivals for the month to date, 3,842 tons; afloat, 1,683 tons.

Copper.—Trade has not been very active but stocks are firmly held apparently in strong hands. Today's quotations follow: Lake, 18½ to 18¾; electrolytic, 18¼ to 18½; casting, 18 to 18¼; London's closing today: £85 2s 6d and £83 7s 6d. Exports for the month to date, 11,384.

Lead.—The demand has been active and prices have advanced slightly. Today's closing, 5.60 to 5.70; St. Louis, 5.60; London, £16 1s 3d.

Spelter.—Refined spelter was in fair demand and the market strong. Today's closings, 6.05 to 6.15; St. Louis, 5.95; London, £26 10s.

Antimony.—The demand has been very active and prices have again advanced. Today's quotations, Cookson's and Hallett's, 21½ to 22½; other grades, 21 to 22.

ST. LOUIS.

St. Louis, April 30.—There has not been a great deal of activity in the metals market this week. Lead has been comparatively quiet, but has held firm. Missouri brands are salable at $5.50, but few sales are reported except to consumers in a small way. Spelter was quiet at $5.95 to $5.97½.

Amalgamated Association. — The thirty-first annual convention of the Amalgamated Association of Iron, Steel & Tin Workers convened in Cincinnati on Tuesday of this week. This convention promises to be the most interesting of any yet held by the association, inasmuch as there are now very big questions to be considered. The independent mills have petitioned for a scale lower than that paid by the steel corporation, this applying to the sheet and tin plate workers, but it obviously cannot be granted without the change of discrimination being laid against the association. During the past year the association has prospered and increased in numbers and there has not been a single disturbance to contend with.

The St. Louis Malleable Castings Co., which has always been closely related to the St. Louis Car Co., now has its offices with the latter company.

THE IRON TRADE REVIEW

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PREPOSTEROUS DEMANDS.

The unfortunate condition which threatens seriously to interfere with the operation of vessels of the great lakes for some time to come grows out of demands on the part of the employes which are utterly unreasonable. There are some minor points of difference which could be easily adjusted, but the vital matter of dispute is the demand made by the longshoremen that the vessel owners recognize the alleged union of mates, an organization which has only a handful of members. At the time of the last big strike on the lakes, the vessel owners took positive stand against allowing the captains, who are the representatives of the owners, from being members of any union. Although the operation of vessels was interfered with for a number of weeks, the final outcome was a complete surrender of the captains. A natural sequence of this victory of the vessel owners was their declaration that the mates, who are assistant captains, should not be union men.

Practically all of the vessels have obtained all the mates they need for service during the season, but now an organization of unskilled laborers, that of the longshoremen, demands that the mates be subject to its jurisdiction and that the vessel owners employ union men as mates. The idea of a crowd of unskilled laborers dominating the mates of the lakes, when only a few of the latter are union men, is preposterous. It has not even been determined by the union men themselves that the longshoremen have any right to exercise authority over the mates, but, pending a decision of an outsider, Mr. Gompers, as to this question, it has been decided to declare a strike. There will, of course, be some difficulty in operating vessels for a time, but no one can seriously doubt that, in a shorter period than that of the last strike, a complete victory will be won by the vessel owners.

EXCELLENT QUARTERLY SHOWING OF STEEL CORPORATION.

There have been thoroughly credible charges in the case of many industrial and railroad corporations that different policies are pursued at different times in the methods of making up statements of earnings, so that at some times the earnings are made to appear unduly large, and at other times unduly small. The motives in such cases have lain beyond the proper administration of the company's affairs.

After five years of experience with the United States Steel Corporation, and comparison of its quarterly and other statements of earnings with the conditions known to exist in the trade, it must be admitted on all hands that no such charge can stand against its management. Its earnings have at all times accurately represented the conditions. Even though, therefore, there may in some quarters be questions raised as to the sufficiency of various appropriations, there can be no question raised as to the trustworthiness of comparisons of earnings reported for different periods. Whatever can be deduced by a comparison of the figures for the first quarter of the current year, made public last week, with figures for previous periods, must be accepted as showing the exact truth as to the state of the corporation's affairs.

The earnings reported for the first quarter of this year were $36,634,490, this sum being the largest, by $9,919,032, reported for any of the five first quarters during which the corporation has been in existence. The best previous first quarter record was the first quarter of 1902 and that is now exceeded by 37.1 per cent.

As quarterly earnings have been returned, the last quarter was not the largest in the company's history, having been slightly exceeded in the second and third quarters of 1902. On Jan. 1, 1904, a change was made in the method of accounting, whereby no profits would be returned until the material involved had passed from corporation control. In 1902 profits were returned when they had been made by a subsidiary on material passing to another subsidiary. Ore is mined almost exclusively in the middle quarters of the year, and in 1902, those middle quarters would have shown much smaller profits, if the present system of accounting had been used, while on the other hand had the former system been used for the first quarter of this year, the showing would have been but slightly reduced. No criticism inured to the corporation for the use of the former system: it was the generally recognized one in such cases; but the change to the more conservative one was commendable.

It can be said, then, that allowing for the change in methods, the earnings of the United States Steel Corporation in the first quarter of this year were by far the largest for a quarter in the five years of the corporation's existence. The result is proof of a most satisfactory condition in the American iron trade. Selling prices averaged considerably lower than in previous periods of large earnings, and the larger profits are due to increased production. The consuming trade has actually required this increased production.

The corporation continues its conservative course of appropriating quarterly nearly all of the current earnings left after paying fixed charges and the preferred dividend, to improvements and the discharge of capital obligations, leaving but a small contribution to surplus. The book surplus of industrial corporations is usually fictitious. There is no desire here to intimate that it is so with the steel corporation, but were it so, it would be a small matter, as the total is allowed to grow so slowly.

The earnings of the steel corpora-

tion since its formation are shown below by quarters. These are the earnings after deducting for ordinary repairs and maintenance and interest on bonds and fixed charges of subsidiary companies. From them are still to be deducted the sinking funds on bonds of subsidiary companies, depreciation and reserve funds, interest on steel corporation bonds, preferred dividends and special appropriations:

Second quarter, 1901	$26,363,841
Third quarter	28,663,843
Fourth quarter	29,759,912
9 mos., 1901	$84,787,596
First quarter, 1902	$26,715,458
Second quarter	37,662,058
Third quarter	36,945,489
Fourth quarter	31,985,759
Year, 1902	$133,308,764
First quarter, 1903	$25,068,707
Second quarter	36,642,309
Third quarter	32,422,955
Fourth quarter	15,037,181
Year, 1903	$109,171,152
First quarter, 1904	$13,445,232
Second quarter	19,490,726
Third quarter	18,773,932
Fourth quarter	21,466,632
Year, 1904	$73,176,522
First quarter, 1905	$23,025,896
Second quarter	30,305,116
Third quarter	31,240,583
Fourth quarter	35,216,063
Year, 1905	$119,787,658
First quarter, 1906	$36,634,490

THE AMERICAN WIRE INDUSTRY.

The full statistics relating to the production of wire have just been given out by the American Iron and Steel Association and are presented elsewhere in this issue. The gain last year over 1904 is not as great as might have been looked for. While the production of wire rods made a new high record, passing 1904, the previous record year, by 6.5 per cent, the production of wire nails showed an actual decrease of 9 per cent from 1904, and indeed fell behind even the tonnage of 1902. While the production of rods increased, from 1904 to 1905, from 1,699,028 to 1,808,688 gross tons, the production of wire nails decreased from 11,926,661 kegs of 100 pounds to 10,854,892 kegs, or from 532,440 gross tons to 484,593 gross tons. The quantity of wire which went into other products, such as fencing, smooth fence wire, and a thousand and one other channels, must have materially increased. The proportion of wire nails produced to rods rolled was 31.3 per cent in 1904 and 26.8 per cent in 1905. There was an increase in wire exports of 24,000 gross tons, so that this comes far short of explaining the difference. Our wire nail exports increased 3,044 gross tons.

At various times there have been appearances which might be construed to support a view that our wire tonnage might ultimately exceed our rail tonnage. It would indeed be quite impressive for the light material to outdistance the heavy in point of total tonnage. More than ten years ago, in 1894, the production of wire rods in the United States almost reached two-thirds the rail tonnage. Then, again, in 1904, there was a big jump in the proportion of rods to rails, compared with 1903. These now appear to have been false alarms, the appearance having been produced rather by rail tonnage having fallen off than by rod tonnage having increased. Last year there was a large increase in rail production and the proportion of rods to rails fell back to less than it was ten years ago.

Statistics of wire rod production were first collected for the year 1888 and the figures are presented in the following table, together with the statistics of rail production, with the percentage which the rod production bore to the rail production in each year. It will be seen that there was a measurably steady increase to 65.9 per cent in 1894, while after that there were ups and downs, with no clear indication, in the figures from 1894 to 1905 inclusive, of any increase in the proportion to be expected in the future.

Production of Wire Rods Relative to Rails, gross tons and percentage:

Year.	Rod Production.	Rail Production.	Proportion.
1888	279,769	1,403,700	19.9
1889	363,851	1,522,204	23.9
1890	457,009	1,885,307	24.2
1891	536,607	1,307,176	41.0
1892	627,829	1,551,841	40.5
1893	537,272	1,136,458	47.3
1894	673,402	1,021,772	65.9
1895	791,130	1,306,135	60.6
1896	623,986	1,122,010	55.6
1897	970,736	1,647,892	58.9
1898	1,071,683	1,981,241	54.1
1899	1,036,398	2,272,700	45.6
1900	846,291	2,385,682	35.5
1901	1,365,934	2,874,639	47.5
1902	1,574,293	2,947,933	53.4
1903	1,503,455	2,902,477	51.4
1904	1,699,028	2,284,711	74.4
1905	1,808,688	3,372,257	53.6

NO NECESSITY FOR FREE TRADE.

The proposition to remove the duty on structural shapes to be used in the rebuilding of San Francisco will meet with little favor except among radical free traders. While it is true that the demand for structural material in this country is strong, and that the mills are well supplied with orders, the tonnage which is likely to be needed in California this year can easily be taken care of by the mills in this country. The policy which has been inaugurated by the principal producers of giving preference to orders from San Francisco will meet general indorsement on the part of other buyers whose orders may be somewhat delayed by the rolling of shapes intended for buildings to be erected in the city recently visited by earthquake and fire. Few, indeed, will be the men who will be so unreasonably selfish as to be unwilling to conform to this policy.

Another point to be considered is that the manufacturers of this country will be glad to give Pacific coast buyers all the time they will need to make payments for material, and it is probable that many who have suffered severely on account of the recent disaster will need time in which to pay. Foreign manufacturers shipping to this country are not in the habit of giving time, and could not be depended upon to do so in this case. The people of the United States have been most liberal in their contributions for the benefit of the sufferers in San Francisco and many millions of dollars have poured into that city. The suggestion of the president that aid from foreign countries be declined has been generally followed. This country is able to take care of its own people at all times and under all conditions, and is fully competent to meet any demands that may be made upon it. It is not probable that more than 50,000 tons of structural material, enough to erect 25 very large buildings, will be required by San Francisco for a year, while the production of structural shapes for 1906 promises to be about 1,500,000 tons. The policy of preference to San Francisco will result in all its needs being promptly met and there is no occasion for departing even for a short time from the

thoroughly established policy of protection in this country.

Congressman Needham, of California, well expressed the sentiments of his own state when, after speaking of the necessity of its products being protected, he said: "Our people would not want to risk breaking down the great economic system of protective tariff, which has built up the state, and without which there can be no prosperity for California."

The action of the house committee of congress, in deciding by a vote of eight to four, not to report the Littauer bill, providing for the compulsory use of the metric system in dealing with government departments will meet the general approval of the people of the country, in spite of the fact that Congressman Southard, the chairman of the committee, and a few others have labored for years in endeavoring to force this system upon the country. During the recent hearings before the committee, positively conclusive reasons were given for not doing anything more than has been done to advance the use of the metric system, which can now be adopted by anyone who sees fit to do so. Now that the movement to abandon the old units of measure has so signally failed, we trust that no one will have the hardihood to attempt to renew the agitation.

The W. A. Jones Foundry & Machine Co., 142 W. North avenue, Chicago, has published a vest pocket catalog of the machine molded pulleys and other transmission equipment manufactured by it. It is a very compact little booklet, complete with data and illustrations of the various power transmitting appliances, with prices, etc., added. The convenient form in which it is printed, should add to the book's value in the minds of all people interested in the line of machinery to which it is devoted.

For some time a suit has been pending between the Brylgon Foundry Co., formerly of Reading, Pa., and Powell & Colné, agents for the Tropenas converter steel process, New York, for breach of contract for using said process. The lower court at Reading decided in favor of Powell & Colné, and upon appeal to the supreme court of Pennsylvania the judgment was confirmed with costs.

MACHINE TOOL BUILDERS

Holding Their Spring Meeting at Atlantic City.

Atlantic City, N. J., May 1.—The spring meeting of the National Machine Tool Builders' Association opened at ten this morning in the Hotel Chalfonte, with E. M. Woodward in the chair. Twenty-five members answered roll call. Several new members were enrolled. After selecting convention committees, reports of officers and standing committees were heard. To expedite work the various lines of tools represented in the association organized into the following special committees to report to the assembly at four p. m: Lathe committee, planer committee, shaper committee, boring mill committee, radial and upright drill committee, milling machine committee.

The convention reassembled at four to consider reports of various committees. It will meet Wednesday morning for general discussion and consider reports of special committees on apprenticeship system and standardization of motors. The standardization of key ways will also be considered and the advisability of advancing prices on machine tools will receive careful consideration. Owing to increased cost of material and especially of labor many believe further advance of prices inevitable, whatever the organization may decide to do officially.

The following members were present: P. E. Montanus, Springfield Machine Co., Springfield, O.; W. P. Davis, the W. P. Davis Machine Co., Rochester, N. Y.; E. M. Woodward, Woodward & Powell Planer Co., Worcester, Mass.; H. J. Hendey, the Hendey Machine Co., Torrington, Conn.; C. H. Alvord, Hendry Machine Co.; Aug. H. Tuechter, Cincinnati Machine Tool Co.; B. B. Quillen, Cincinnati Planer Co.; J. B. Doan, the American Tool Works Co., Cincinnati, O.; C. H. Norton, Norton Grinding Co., Worcester, Mass.; F. E. Reed, the F. E. Reed Co., Worcester, Mass.; Chas. E. Hildreth, Whitcomb-Blaisdell Machine Tool Co., Worcester, Mass; H. L. Flather & Co., Inc., Nashua, New Hampshire; Henry B. Binsse, the Binsse Machine Co., Newark, N. J.; Israel H. Johnson Sr., I. H. Johnson Jr. Co., Philadelphia; Murray Shipley, the Lodge & Shipley Machine Tool Co., Cincinati; Richard E. Leblond, the R. K. Leblond Machine Tool Co., Cincinnati; Geo. F. Stewart, the Bradford Machine Tool Co., Cincinnati; A. E. Newton, Prentice Bros. Co., Worcester, Mass.; O. N. Flather, the Mark Flather Planer Co., Nashua, N. H.; E. Rivett, the Rivett Lathe Mfg. Co., Boston; Fred A. Geier, Cincinnati Milling Machine Co.; Wm. A. Greaves, Greaves, Klusman & Co., Cincinnati; H. O. Hoefinghoff, the Bickford Drill & Tool Co., Cincinnati; H. W. Breckenridge, Colburn Machine Tool Co., Franklin, Pa.; V. F. Hatch, Builders' Iron Foundry, Providence, R. I.; W. D. Woolson, Jones & Lamson Machine Co., Springfield, Vt.; George O. Gridley, Windsor Machine Co., Windsor, Vt.; C. G. Watsel, Baush Machine Tool Co., Springfield, Mass.; George J. Burns, Chandler Planer Co., Ayer, Mass.; E. P. Bullard Jr., Bullard Machine Tool Co., Bridgeport, Conn.; Clarence E. Whitney, Amos Whitney Mfg. Co., Hartford, Conn.; George A. Lautz, Niagara Machine & Tool Works, Buffalo; Chester A. Hoefer, Hoefer Mfg. Co., Freeport, Ill.

Among the visitors were: A. F. Chamberlain, Westinghouse Electric & Mfg. Co., Cincinnati; F. H. Brown, National Supply & Machinery Dealers' Association, Pittsburg; J. A. Hill, New York; F. L. Eberhardt, Newark, N. J.; H. Prentiss, New York.

MANHATTAN BRIDGE.

Again the Subject of Injunction.—Rails Sold and Inquiries Pending.

(Special Telegram.)

New York, May 1.—The Pacific Electric Co. has just purchased 2,000 tons more of standard rails for 1906 delivery, making its total takings for this year's shipment 14,000 tons. The Spokane & Inland railway has ordered 7,000 tons, the Louisville & Indianapolis Traction Co., 4,500 tons; the Delaware & Hudson, 16,000 tons; the Vandalia line, 6,500 tons and the Oklahoma railway another lot of 13,000 tons. Negotiations are also under way for fully 35,000 tons, for 1907 delivery.

Two temporary injunctions have just been secured in the New York Supreme Court by taxpayers, representing disgruntled bridge building companies, by the terms of which Commissioner Stevenson of the department of bridges, is restrained from opening the bids and awarding the contract for supplying and erecting the 43,000 tons of structural steel needed in the new Manhattan bridge. The bridge commissioner was about to open the bids when he was informed that the injunction had been granted.

Milliken Bros., Inc., have just secured a contract for 500 tons of steel required for a sugar mill in Vera Cruz, Mex. The Hay Foundry & Machine Works has captured a contract for 1,800 tons for use in a new building on Fifth avenue, near 35th street.

PRODUCTION OF CUT AND WIRE NAILS IN 1905.

The production of iron and steel cut nails and cut spikes and wire nails in 1905, as ascertained from the manufacturers by the American Iron and Steel Association, is given below. The statistics of the production of iron and steel cut nails and cut spikes embrace only standard sizes of nails and spikes cut from plates. They do not embrace railroad and other forged spikes, wire nails of any size, machine-made horseshoe nails, cut tacks, or clout, basket, shoe, or other small sizes of nails. In the statistics cut spikes are always included with cut nails.

The production of cut nails and spikes cut from plates in 1905 was 1,357,549 kegs of 100 pounds each, against 1,283,362 kegs in 1904, an increase of 74,187 kegs. In 1886 the maximum production of 8,160,973 kegs was reached. The following table gives the production of cut nails and cut spikes by states in 1904 and 1905, iron nails being separated from steel nails for the latter year. Of the total production in 1905 a little over 32 per cent was cut from iron plate and almost 68 per cent from steel plate.

States.	1905—Kegs of 100 pounds.			1904.
	Iron.	Steel.	Total.	
Pennsylvania	345,076	412,331	757,407	698,326
W. Va. and Ind.		210,345	210,345	245,997
Mass. and Ohio		158,113	158,113	182,981
Md., Va., Ky., Ill., Wis., and Cal.	89,503	142,181	231,684	156,058
Total	434,579	922,970	1,357,549	1,283,362

Our production of wire nails in 1905 amounted to 10,854,892 kegs of 100 pounds, as compared with 11,926,661 kegs in 1904, a decrease of 1,071,769 kegs, or almost 9 per cent. Of the total production in 1905 7,175,418 kegs were made by the United States Steel Corporation and 3,679,474 kegs by independent companies, as compared with 7,998,912 kegs by the corporation and 3,927,749 kegs by independent companies in 1904. Wire nails were first made in this country in commercial quantities in 1883 or 1884. It was not until 1886, however, that our approximate production amounted to 600,000 kegs. Below we give the production of wire nails by states in 1904 and 1905, in kegs of 100 pounds.

States—Kegs of 100 pounds.	1904.	1905.
N. H., Mass., R. I., and Conn.	247,157	264,024
N. Y., N. J., and Pennsylvania	4,869,401	4,504,376
Md., Ky., Alabama, and Ohio	3,124,624	2,861,587
Indiana and Illinois	3,033,756	2,531,774
Michigan, Wis., and Colorado	651,723	693,131
Total	11,926,661	10,854,892

The wire nails produced in 1905 were all made of steel and were turned out by 54 works in 16 states, as compared with 56 works in the same number of states in 1904. For 1905 and 1904 it was necessary to estimate the production of one plant. The maximum production of wire nails was reached in 1904; the year of next largest production was 1902.

Years.	Cut nails.	Wire nails.	Total.	Wire nails over cut.
1896	1,615,870	4,719,860	6,335,730	3,103,990
1897	2,106,799	8,997,245	11,104,044	6,890,446
1898	1,572,221	7,418,475	8,990,696	5,846,254
1899	1,904,340	7,618,130	9,522,470	5,713,790
1900	1,573,494	7,233,979	8,807,473	5,660,485
1901	1,542,240	9,803,822	11,346,062	8,261,582
1902	1,633,762	10,982,246	12,616,008	9,348,484
1903	1,435,893	9,631,661	11,067,554	8,195,768
1904	1,283,362	11,926,661	13,210,023	10,643,299
1905	1,357,549	10,854,892	12,212,441	9,497,343

The accompanying table gives the production of iron and steel cut and wire nails in this country in the last ten years, in kegs of 100 pounds. The excess of wire nails over cut nails in each of the ten years is also shown. Since 1893 the production of wire nails has annually exceeded that of cut nails. In 1892, however, the production of cut nails and wire nails was about the same.

In 1905 our exports of cut nails and cut spikes amounted to 17,674,099 pounds, equivalent to 176,741 kegs of 100 pounds, against 20,772,049 pounds, or 207,720 kegs, in 1904. Our exports of wire nails in 1905 amounted to 80,273,411 pounds, or 802,734 kegs, against 73,455,365 pounds, or 734,554 kegs, in 1904. Our imports of cut nails and wire nails are very small. In 1905 our total imports of cut nails and cut spikes amounted to only 27,272 pounds, or 273 kegs, against 70,125 pounds, or 701 kegs, in 1904. Our imports of wire nails in 1905 amounted to 53,769 pounds, or 538 kegs, against 42,954 pounds, or 430 kegs, in 1904.

BLOWING ENGINES PURCHASED.

The Carnegie Steel Co. has recently ordered from the Allis-Chalmers Co., of Milwaukee, Wis., four gas driven blowing engines and one gas engine electric unit for its Homestead plant. Each blowing unit consists of a horizontal twin tandem, double acting Allis-Chalmers gas engine of 3,000 B. H. P. and two direct driven blowing tubes having a capacity to deliver 30,000 cubic feet of free air per minute against a pressure of 18 pounds per square inch and so designed and proportioned that they can be operated at any pressure up to 30 pounds. These blowing tubes are of the Slick type,—the patents for which are owned by the Allis-Chalmers Co. By using this type, an inlet valve area of 25 per cent and over is easily attainable, thus insuring that the cylinder will fill completely at any speed at which the engine is able to operate it.

The electric unit consists of a horizontal twin tandem Allis-Chalmers gas engine direct connected to a 2,000-kilowatt, 25-cycle, 3-phase, 6,600-volt Allis-Chalmers alternating current generator.

The engine ends of these five units will be exact duplicates, with the exception of the fly wheels, which, in the case of the blowing engines, will be somewhat lighter, as the demands for close regulation will not be so severe. The generator for the electric unit will be of the well known Bullock revolving field type, and will be built at the Cincinnati works of the company.

HEARTY WELCOME

To Dixie Land Extended the American Society of Mechanical Engineers.

(Special Telegram.)

Chattanooga, Tenn., May 2.—The fifty-third meeting of the American Society of Mechanical Engineers opened in this city last evening with 126 members registered at the first session, which was held in the Masonic Temple. Mayor Freyerson in his address of welcome called attention to the fact that the present development of modern civilization is due to the engineering profession. Being a new science, engineering has had no precedents to guide it, and no set standards to attain as in literature and art. The impossible of yesterday, through its agency, is the accomplished fact of today, and the commonplace of tomorrow. Chattanooga, one of the leading manufacturing cities of the south, not only welcomed the society, but thanked it for the honor conferred in being selected as the convention city.

President Taylor, replying for the society, stated that the south was truly a land of promise and that the country was expecting its speedy industrial development on an extensive scale. Engineers, he declared, did not recognize sectional divisions and many of them were building in the south and would make their homes there. After these addresses, a social reunion was held.

The convention spent Wednesday morning in a professional session and in the afternoon enjoyed an excursion to Lookout mountain.

The United States Steel Corporation is advised from San Francisco that for the time being the offices of its constituent companies, the National Tube Co., and the American Sheet & Tin Plate Co., have moved into the quarters of the American Steel & Wire Co.

LONGSHOREMEN'S DICTATION RESENTED

AND STRIKE TIES UP VESSELS ON THE GREAT LAKES.

Carriers Will Fight for Principle and Are Confident of Winning—Furnaces Generally Well Supplied With Ore.

The first of May brought the expected strike of the longshoremen engaged in the lake shipping industry. Negotiations aiming at the settlement of pending difficulties failed through the persistent refusal of the union of dock hands to recede from its claim of recognition for the union recently organized among the mates. The incidental question of wages and number of working hours was also raised, but in the absence of the other point of difference it could doubtless have been settled without resort to vigorous measures. As the mates are next to the captains in point of authority on the lake freighters and are looked upon as successors to their positions, the lake shippers naturally could not see why a union organized among their forces should be so closely connected with the longshoremen's union, which is composed only of the unskilled laborers employed about the docks in loading and unloading.

Although at this early date it is difficult to determine the exact extent of the strike, it appears that the longshoremen very generally have answered the call of President Keefe, of their union, and have stopped work. It also appears that the mates, whose union proclivities are declared by labor leaders to be the cause of the whole trouble, have with few exceptions declined to leave their vessels. Few of them are members of the union. A limited number quit on the first opportunity, but it is believed this includes practically all who will go out. The mates generally have entered into the fight in a half-hearted sort of way, in fact, they have been dragged unwillingly into the contest. A few non-union docks were operating after the union longshoremen had been called out and these will doubtless continue to run to capacity.

On the question of the recognition of the mates there will be no compromise. The lake shippers are positive in their position that there will be no recognition, no matter how long continued the strike may prove to be. It is not a question of hours or wages; it is a question of principle, and of planning for the future of lake shipping peace and prosperity. The mates of today are regarded as the legitimate successors of the lake captains in the course of a few years at most. As such they will occupy positions of responsibility for their companies, being practically the managers of the great coal and ore freighters while en route. Their position in importance hence is high and the shippers maintain that as they are to be their executives they should not be bound by union ties any more than are those holding executive positions in the company offices. What is more, recognition of the mates will in the course of a few years bring about a recurrence of conditions which caused the great strike of two years ago, when the captains abandoned their union. On this point the lake carriers are firm, and they are prepared, if necessary, to make a heavy sacrifice in the way of lost business, to gain their contention.

The situation is complicated by the question of jurisdiction over the mates. It has not yet been decided that the longshoremen, who are striking in their supposed interests, are in fact connected with their organization. The mates' union is essentially a shipping union, the longshoremen's just as essentially a union of dock workmen, and hence is an organization of land laborers. An appeal for a decision on the question of jurisdiction has been made to Samuel Gompers, president of the American Federation of Labor, but so far he has withheld a verdict. It is well known that President Keefe, of the longshoremen, aspires to the place now occupied by Mr. Gompers; a decision by the latter in his favor would wonderfully strengthen the association of Mr. Keefe, which recently, through the installation of automatic machinery and for other reasons, has been dwindling steadily. Accordingly, it is not believed that a decision in favor of the longshoremen will be rendered, and it is also stated that Mr. Gompers would scarcely dare to decide against his known rival. It is expected that the matter will be held in abeyance, in which case the union will fight its campaign with divided forces.

Although the strike has brought ore traffic practically to a standstill, little inconvenience will result for some time. As a rule furnaces are well supplied. A canvass of the pig iron interests in the Cleveland district Tuesday disclosed the fact that yards generally contain enough ore to run a month and in many cases for six and eight weeks. This condition may be taken as the average for the country. It is understood that the Steel Corporation has its furnaces well supplied though there are some few exceptions. Ore shipments from docks have been extremely heavy during the last few weeks. April 1, 1905, the tonnage on docks at lower lake points was 3,400,000; April 1, 1906, it was 3,000,000: May 1, 1905, it was 2,271,631, and the present amount is doubtless much less, probably in the neighborhood of 2,000,000.

The importance of the strike is more serious to the Pittsburg district than it is to the immediate vicinity of the strike. Luckily most of the furnaces have anticipated the trouble and are prepared for it, and should the strike be of short duration it would not be felt at all. An official of the Carnegie Steel Co., in an interview Tuesday stated that this company was amply fortified to withstand a strike and could operate its furnaces to capacity practically all summer without drawing upon the supply of ores brought from the head of the lakes since the opening of navigation. Some of the independent interests, however, are not in as good shape as the steel corporation and several weeks ago it was reported that some of them were experiencing a scarcity of Bessemer ores.

It may be confidently stated that a month or six weeks will not make much difference in the beginning of the new supply, as with but few exceptions the stock piles at the furnaces are sufficient to tide them over for this period. With furnaces whose supply of high grade ores is not so large there will be difficulty in keeping on the regular mixes, but these can change and melt different ores in their mixes. There is plenty of basic ore in stocks.

Progress of N. M. T. A.

Rapid strides have been made by the National Metal Trades Association during the past fortnight. The New York association has taken in the principal employers of part of New Jersey and formed the New York and New Jersey branch of the National Metal Trades Association. Its jurisdiction will include Greater New York and that part of New Jersey north of Trenton. According to Commissioner Henry C. Hunter, the new branch will have 162 members, employing more than 1,500 men. The association is also materially strengthened in this section by the decision of the Worcester Metal Trades Association to

become a branch of the National Association. This action was taken at the annual meeting held Tuesday, April 24, after an exhaustive debate. The decision was practically unanimous.

Worcester Metal Trades.

New officers were chosen by the Worcester Metal Trades Association at the annual meeting as follows: President, Geo. M. Brooks, Harrington & Richardson Arms Co.; first vice president, E. M. Woodward, Woodward & Powell Planer Co.; second vice president, A. W. Whitcomb, Whitcomb & Blaisdell Machine Tool Co.; treasurer, J. P. Bird, Hobbs Mfg. Co.; secretary, M. C. Snyder, J. E. Snyder & Son. Councillors, Geo. E. Alden, Norton Emery Wheel Co.; B. G. Luther, B. G. Luther & Co.; John R. Back, F. E. Reed Co.; and A. E. Newton, Prentice Bros. Co. The annual meeting, which had the largest attendance in the history of the association, was addressed by J. A. Emery, secretary of the Citizens' Industrial Association, and Geo. H. Hugo, president of the Boston Employers' Association.

Wages in Four Countries.

Some interesting facts relating to the rate of wages paid in the United States, Great Britain, Germany and Belgium are contained in a recent bulletin of the Bureau of Labor. In 13 years, from 1890 to 1903, wages increased on an average of 21.8 per cent in Germany, 11.9 per cent in Great Britain, and 20.7 per cent in the United States. The level of wages in Germany, however, continues low as is illustrated by the figures of the average wage for iron molders in 1903. In Germany this was .1104 per hour, in Great Britain .1787 and in the United States .3036. In a number of lines the American wage was more than twice that of Great Britain and three times that of Germany.

Structural Workers' Strike.

A strike of the structural iron and bridge workers of the eastern half of Ohio, which was declared at a meeting held at Cleveland, Sunday, became effective May 1. The old wage scale, which expired in January, provided for 50 cents per hour. The men demanded that it be renewed at 60 cents per hour, but this was refused, although in some few instances the advance was granted. A considerable number of men employed at Youngstown and vicinity on the work of erecting new plants are affected. On May 1 the decision of the Pittsburg Erectors' Association, composed of the larger construction companies in that district, to carry on all structural work on the open shop principle, became effective.

CORPORATION OFFICIALS

Go to San Francisco to Examine Conditions and Report Probable Needs.

Under the direction of Frank Baackes, general sales agent of the American Steel & Wire Co., Chicago, the United States Steel Corporation has despatched representatives from its various subsidary companies to San Francisco. The corporation's offices in that city were destroyed in the recent fire and earthquake, and part of the duties of the delegation will be to straighten out the credits and losses, re-open negotiations with old and new customers, survey the general situation and report on the probable needs of that community. In the party are the following gentlemen, in addition to Mr. Baackes: John A. Neale, assistant general manager of sales and structural engineer, Carnegie Steel Co., Pittsburg; F. T. Bentley, traffic manager, Illinois Steel Co.; R. S. White, credit manager American Steel & Wire Co., Credit Manager Kennedy of the National Tube Co., Chicago; John Duncan, general sales agent, Western Tube Co., Kewanee, Ill., and B. B. Ayres, American Steel & Wire Co. The party left in a private car Thursday night last. It is understood the San Francisco plant of the American Steel & Wire Co. escaped both calamities without any appreciable damage.

OBITUARY.

John N. Lauth, manager of an iron plant at Ferreria, Jalisco, Mex., died recently at that place. He was a former resident of Pennsylvania, where he was well known to the iron and steel industry.

Hugh I. McCaffrey, vice president of the McCaffrey File Co., Philadelphia, died April 21 from pneumonia. Although only 29 years of age, he had been vice president of the company for several years.

James McKay, a prominent business man of Pittsburg, died suddenly April 29. He was born in Ireland in 1829 and came to America in 1850. He was the founder of the James McKay Chain Co., and was interested in a number of oil, mining and banking enterprises.

William D. Zehnder, president of the Scranton Bolt & Nut Co., Scranton, Pa., died April 21. He started in a comparatively small way with this company 10 years ago, and by his able and energetic management built up the business into one of large proportions. He was also vice president of the Wilmington Iron Co. and was a director of the Passaic Steel Co. He was 49 years of age.

Adolph Leitelt Jr., president and general manager of the Adolph Leitelt Iron Works, Grnd Rapids, Mich., died April 24, at his home in that city after a brief illness. He was a graduate of the Notre Dame University, and was later a student of the Boston Institute of Technology. Since the death of his father in 1897 he had had complete charge of the business. He was 46 years of age.

Brigadier-General Edward W. Serrell died in New York, April 25, at the age of 80. He was well known as a civil and military engineer and surveyed the Nicaragua and Panama routes of the present day. He was chief engineer of construction of the Niagara suspension bridge and later of the Hoosac tunnel. For his services in the civil war he was given the rank of brevet brigadier general, and three times received the thanks of congress for his work on canal problems.

Aaron M. Wilcox died recently at Avalon, Santa Catalina Island, off the coast of California. He became interested a quarter of a century ago in the Ontario Rolling Mill Co., now the Hamilton Steel & Iron Co., Hamilton, Ont., which he continued to hold until his death. From 1885 to 1888 he was in charge of the Vulcan Iron Works, St. Louis, Mo., with marked success and later went to Cleveland to continue in the iron and steel business. For several years, however, he had been practically retired and spent much of his time in travel.

Henry C. Rouse, president of the M. K. & T. railroad, died at his home in Cleveland, April 29, after an illness of two weeks with pneumonia. Mr. Rouse was born in 1853 and was educated in this country and abroad. In his early career he was heavily interested in manufacturing, being first general manager of the Joel Hayden Brass Co., then president of the Hayden Co., with factories at Haydenville, Mass., and in 1884 becoming president of the United Brass Co., of New York. At that time he was also treasurer of the Lorain Mfg. Co., and of the Britton Iron & Steel Co., of Cleveland. At the time of his death he was president of the Booneville Railroad Bridge Co., but for the last twenty years his attentions had been chiefly devoted to railroading.

Leading Export Nation.—The calendar year 1905 shows the United States ranking as the leading export nation of the world. The specifications recently made public placed the exports for that year at $1,621,581,000 against $1,606,057,000 for the United Kingdom which up to this time has ranked first. In imports the United States ranks third with $1,195,470,000, being surpassed by Great Britain and Germany.

PERSONALS.

Peter White is at the University of Michigan hospital undergoing treatment for throat trouble.

Howard Ralls has been appointed purchasing agent at the Gadsden plant of the Southern Steel Co.

T. C. Gundelfinger, former chief clerk of the Star Iron Foundry, St. Louis, Mo., has been made superintendent.

Robert Lewis has been made general manager of the tinplate mills of the McClure Co., Washington, Pa., succeeding W. Davey, resigned.

Herbert F. Stimpson is in charge of the industrial and architectural engineering department recently added by the Robert & Abbott Co., Inc., Schofield building, Cleveland.

Henry P. Miller has opened an office in the Real Estate trust building, Philadelphia, where he will conduct a brokerage business in railroad and contractors' equipment and scrap.

S. M. Miller, master mechanic of the Columbus shops of the Pennsylvania railroad, has resigned to become vice president and general manager of an electric company in Philadelphia.

J. S. Ralston, president of the Ralston Steel Car Co., has purchased a country home at Columbus, O., where he has removed his family from Chicago.

Thomas L. Wayne, superintendent of the Blymer Foundry, Cincinnati, has acquired a half interest in the Troy Foundry, Troy, O., and has taken up active business management of the plant.

John D. Fry, formerly with the Westinghouse Electric Mfg. Co., Pittsburg, Pa., has associated himself with the Hawley Down Draft Furnace Co., of Chicago, in charge of its Schwartz melting furnace department.

Eugene Griffin, first vice president of the General Electric Co., is in Europe, where he will remain for some time looking after the interests of French and British companies in which he is interested.

Joseph D. DuBoise, a retired iron and steel manufacturer of Wheeling, W. Va., was 79 years of age April 16. This occasion was celebrated by friends at Seabreeze, Fla., where he is spending the winter.

Andrew Carnegie delivered an address at Kenyon College, April 26, the occasion being the presentation by him of $60,000 to endow a chair of economics in memory of Edwin M. Stanton. The degree of L. L. D. was conferred.

John C. Jay, Jr., has been advanced to New York sales agent of the Pennsylvania Steel Co. to fill the place made vacant by the resignation of A. E. Aeby, who becomes general manager of the Carbon Steel Co., Pittsburg.

Theodore L. Condron has associated with himself F. F. Sinks, his principal assistant, under the firm name of Condron & Sinks, to carry on the business of preparing designs for and superintending the construction of steel and reinforced concrete structures. Offices are at 1741 Monadnock block, Chicago.

John H. Wynne has resigned as mechanical engineer of the Illinois Central to become western manager of the Atlantic Equipment Co., and to represent the American Locomotive Co. He will succeed M. E. Hotchkiss, and will be located in the Railway Exchange, Chicago.

Arnold K. Reese, who several years ago went to Cardiff, Wales, to take charge of the blast furnace plant of Messrs. Guest, Keen & Nettlefolds, Ltd., at that place and to introduce American blast furnace practice, has recently been appointed manager of the whole Cardiff works, which include four blast furnaces, one 40-ton acid Siemens Martin furnace, one 160-ton Talbot continuous furnace and a ship and boiler plate mill.

H. A. Marting, president of the Marting Iron & Steel Co., Ironton, O., was a speaker at the recent merchants' banquet in that city. In the course of his remarks he predicted that the time is not far distant when the native southern Ohio ores will again be in demand. He declared that within the next 20 years Ironton would have a nine-foot stage of water in the Ohio river, and would be connected with the great lakes by a canal of sufficient size to permit the passage of ore barges.

W. D. Pence has been elected to the chair of civil engineering at University of Wisconsin, filling the vacancy caused by the resignation of W. D. Taylor who has become chief engineer of the Chicago & Alton. Dr. Edward B. Van Vleck, professor of mathematics at Wesleyan University, has been appointed to a like position at Wisconsin made vacant by the resignation of Prof. C. A. Van Velzer. Professor Pence graduated from University of Illinois in 1886, entering the employ of the Santa Fe where he rose to the position of assistant engineer of maintenance of way and resident engineer. In 1898 he resigned to enter the faculty of the University of Illinois and a year later took the chair of civil engineering at Purdue where he has since remained. He has assisted important governmental work, and is well known as an author.

PRODUCTION OF WIRE RODS IN 1905.

The American Iron and Steel Association has received from the manufacturers complete statistics of the production of iron and steel wire rods in the United States in 1905.

The production of iron and steel wire rods in this country in 1905 amounted to 1,808,688 gross tons, against 1,699,028 tons in 1904, an increase of 109,660 tons, or over 6.4 per cent. Of the total production in 1905 1,807,407 tons were steel rods and 1,281 tons were iron rods. In 1904 the steel wire rods rolled amounted to 1,697,862 tons and the iron rods to 1,166 tons. The maximum production was reached in 1905 and the year of next largest production was 1904. The following table gives the production of iron and steel wire rods by states in the two years.

States—Gross tons.	1904.	1905.
Mass., Conn., R. I., N. Y., and N. J.	228,289	249,835
Penns., Kentucky, Ala., and Ohio	973,801	1,038,212
Indiana, Illinois, and Colorado	496,938	520,641
Total	1,699,028	1,808,688

Pennsylvania made the largest quantity of wire rods in 1905, its production amounting to over 32 per cent of the total for the whole country. Illinois was second, Ohio third, and Massachusetts fourth. Eight other states, Indiana, Kentucky, Colorado, New York, New Jersey, Alabama, Rhode Island, and Connecticut, also rolled wire rods in 1905 in the order named. All the states mentioned also rolled iron or steel wire rods in 1904.

Below is given the production of iron and steel wire rods from 1888 to 1905. Prior to 1888 wire rods were not separately classified in our tables.

Years.	Gross tons.	Years.	Gross tons.	Years.	Gross tons.
1888	279,769	1894	673,402	1900	846,291
1889	363,851	1895	791,130	1901	1,365,934
1890	457,099	1896	623,986	1902	1,574,293
1891	536,607	1897	970,736	1903	1,503,455
1892	627,829	1898	1,071,683	1904	1,699,028
1893	537,272	1899	1,036,398	1905	1,808,688

During the calendar year 1905 our exports of wire rods amounted to 6,514 gross tons, as compared with 20,073 tons in 1904. Our imports of wire rods in 1905 amounted to 17,616 tons, as compared with 15,313 tons in 1904.

Will Build Coke Ovens.—The Thompson Connellsville Coal & Coke Co., which has just been reorganized with a capital stock of $3,000,000, has secured a large tract of coking coal land in the Connellsville region, and will immediately start the construction of a mining town and several hundred coke ovens.

CHAIN MAKING: ITS HISTORY AND DEVELOPMENT.

The Lelong Chain Machine, the Latest Device for Rapid and Economical Production.

BY ANDRE JOCKARN.

The most serious problem that has presented itself to those engaged in the manufacture of chain, has been to offer a type of link that will combine the requisite elements of strength and elasticity with that of safety, and yet which can be produced in a practicable manner. For years, in all countries of the world where chain is a merchantable commodity, skilled mechanics have spent much time and money in an endeavor to produce a chain link that presents none of the serious disadvantages of the type of welded chain link of today. Thus, we find in India, an attempt to cast chain in brass; in France, chain that is welded electrically, which, while presenting some advantages over gas or coke welded chain, yet does not produce the perfect link; in England, chain links cast in steel and links rolled or cut from a solid bar of iron or steel. None of these processes have proven themselves worthy of commercial recognition.

Glancing back over the history of chain, its manufacture and use, while the record is not as complete as it should be, we find much of interest. While there is no authentic record to show the initial development of the chain link, it is no doubt an ancient institution, dating back to and probably having its origin in the iron age, when the latent possibilities of iron were discovered.

The first authentic record of its use was in 1638 when Phillip White, an English blacksmith, obtained a patent for a mooring chain, composed of welded links. At that time hempen ropes were used exclusively for this purpose and the endeavor to introduce the chain met with much opposition. After mooring chains had been experimented with and their value demonstrated, Sir Claudesly Shovel, an English admiral, recommended, in 1690, their use in the navy, but it was not until 1808 that the first English naval vessel was equipped with a mooring chain. The initial voyage of this vessel with the new type of mooring chain was most satisfactory. This led to an increasing demand for mooring chain which taxed the limited capacity of production to the utmost.

The first chain links for mooring chain use were oval in shape and of the close link type similar to those used on cranes. About this time serious defects appeared in many sets, and this resulted, first, in a 900-ton testing machine being erected at the works of Samuel Brown, in 1809, and secondly, in the introduction of supports or studs across the center of each link, which prevented the link being narrowed and pulled out of shape when subjected to a severe strain. The studding of a chain link increased its tensile strength considerably and proved so satisfactory that stud link chains exclusively are still used on vessels. In 1820 the first chain of 1½-inch diameter was made, marking an epoch in chain manufacture. As the demand increased, it was found possible to make still larger sizes of chain, on which the welds were made on the side of the link, instead of on the end as formerly and in 1840 we find the first record of side welded chain. Up to 1847 the largest size of chain that had been welded was 2¼ inches, which was side welded. At the present time chains are large as 3¼ inches diameter are made.

The serious defects in welded links became more and more apparent as their use increased and after a number of serious catastrophies resulted from chains breaking due to defective welding, Lloyds in 1853 to 1858 established a series of tests to which chain for their vessels had to be subjected before acceptance by them. By 1860 the menace had grown so formidable that Parliament established a commission to inquire into the matter and in 1865, as a result, the Board of Trade requirements were established, calling for test, inspection and stamping of chain offered for sale, which requirements are still in effect.

The various rules and requirements governing this product resulted in more care being taken in its manufacture, but by reason of the way in which it was made, it could not be determined whether or not a perfect weld had been effected until the chain had been subjected to the strains attendant upon their use.

While subjecting a chain to a proof strain before use reduces the possibility of an imperfectly welded chain being sent out, yet it does not fully guarantee the chain to be perfect, as in a great number of cases the chain has broken shortly after being placed in use, and at a lower strain than that to which the chain-proof tested before being placed in use. The quality of the weld has always been dependent upon the skill of the workman, who himself cannot always tell whether or not a perfect weld has been accomplished.

The method of welding is in itself obsolete and irrational, but never since its introduction has any method been evolved, up to this date, whereby a continuous length of chain could be produced, by any advantageous process, fulfilling all the necessary requirements of strength, elasticity and safety, without each link being joined and welded by hand into the preceding link. Owing to the rapidity of production, it is often the case that the material has grown too cold, when the weld is attempted, to secure a perfect union of fibre, while on the other hand, the fibre of the material is often burned in attempting a weld at too high a heat. Also the material scales rapidly when in contact with air and these scales, flaking off and cooling, as the ends are overlapped, lie between the joined ends of the link and prevent them from uniting in that state of perfection necessary to give each link the absolute certainty of safety.

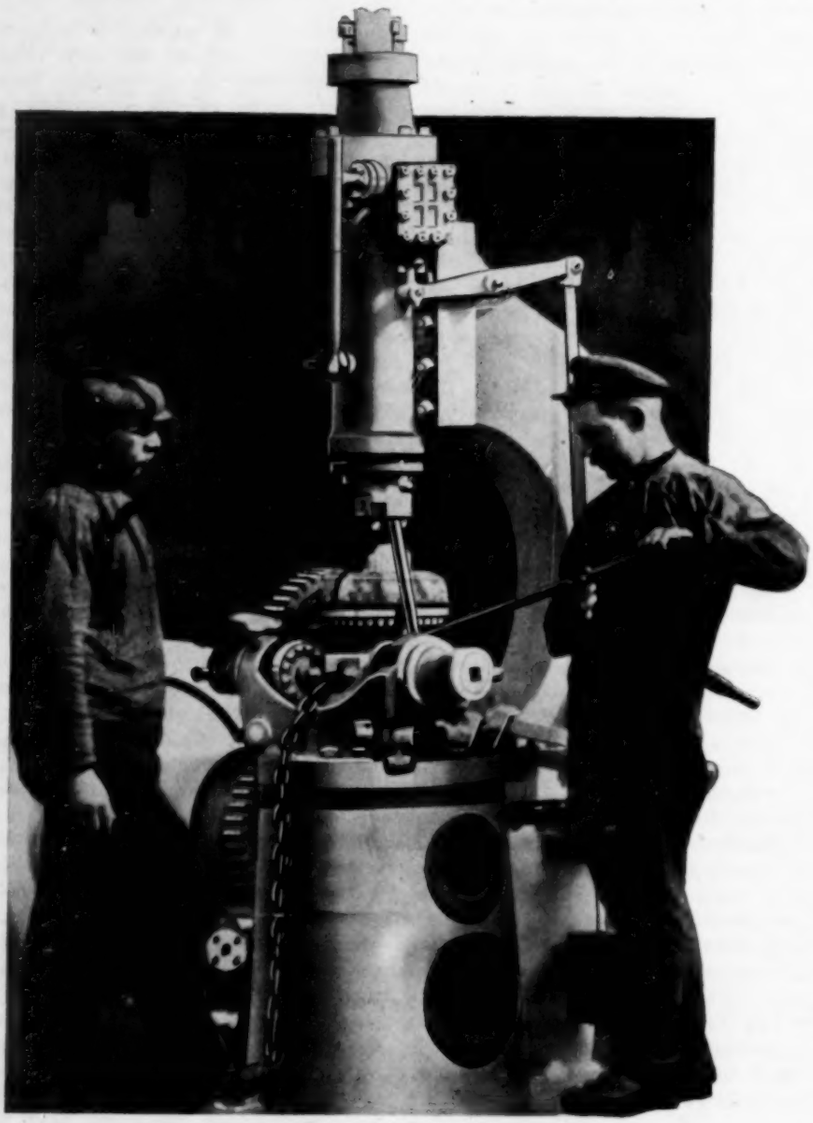
This phase of uncertainty has been given special attention by many authorities, as by the English Parliament in 1860 and by the United States government in 1875, when a commission was appointed to inquire into the causes and remedy for the weakness of structure in welded chain links and to determine an approximate idea of the weakening effect, on the finished product, of the welding of a chain link. Theoretically a welded chain link should possess the strength of double the single bar of which the link is made, as a link of chain being formed by welding at the end of a bar of material bent into oval shape, is practically two bars of material joined at the ends and should, therefore, have the strength of these two bars or double the single bar. This, however, is not the case, as shown by the government report below.

Out on 435 welded links tested by this committee, in 1875, 217 links or 49.9 per cent broke in the quarter near the weld, 116 links or 26.8 per cent broke in the weld of the link, 65 links or 14.9 per cent broke in the quarter near the butt, 21 links or 4.8 per cent broke in the butt of the link, 16 links or 3.7 per cent broke in the sides of the link. In other words,

about 75 per cent of the links tested showed defects due to their being welded, while only about 4 per cent of the links proved themselves to have the strength of double the bar from which they were made. The butt and the weld of a link are naturally the weakest point, especially the quarters near the butt and the weld, where the strain is a combination of shearing and tensile strain, while on the sides, where the ultimate strength of the link is proven, the strain is essentially a tensile strain. From the strains at which these 435 links broke, it was found that the average strength of the welded link is only about 50 per cent of the double bar of material, or that of a single bar, instead of 100 per cent of the double bar, as theoretically assumed.

Thus we find on account of the many irremediable defects shown to exist in all welded chain, mechanics have aimed their energies and efforts to accomplish the production of chain links possessing all of the advantages and none of the disadvantages of the end or side welded link.

As early as 1865 a chain of some twenty odd links was exhibited, having been cast from steel, link by link. Each link was cast joined to the previously cast link, which was made part of the succeeding mold. On account of the shrinkage of the steel, it was necessary to free the link from the mold at once in order that it might cool and shrink uniformly. In order to secure this result, the links were chilled cast, or cast in an iron mold, which presented the necessary strength of mold to retain the cast steel in shape and which still enabled an immediate removal of the cast link from the mold. Aside from its interest as an experiment, this process of manufacturing weldless chain may be passed without further comment, as it is not practical. It must be here admitted, however, that should a practical method of manufacture be devised, a chain composed of cast steel links presents the most admirable qualifications of strength and safety. Out of all the patent weldless chain links which have been subjected to breaking tests, the cast steel links gave the most remarkable indication of superior strength, but naturally the lowest record of elasticity. Lack of elasticity is, in fact, the most serious objection to the cast steel link.



THE LELONG CHAIN MACHINE.

In 1881, M. Oury, of the Cherbourg Arsenal, France, secured a patent on the manufacture of a continuous length of chain from a solid cruciform steel bar, by cutting out the part of the bar not needed, until a series of joined links remained. Multiplicity of operation and high cost negatived this process. In 1889, H. Rongier, of Birmingham, England, devised a similar process for the cutting out of studded chain links from a solid bar of steel.

Otto Klatte, a German engineer, from 1894 to 1900, was granted a series of twelve patents, covering a machine for the rolling out by machinery, instead of cutting or stamping out by hand, a series of connected chain links from a solid iron bar of cruciform shape. By means of a large complicated rolling press, the cruciform bar passed, hot from the rolls of the mill, between a set of four-wheel rolls, so beveled that the lines of contact, when brought together, were at right angles to each other. The beveled edge of each roll was so formed that as the hot iron bar passed through them, the material not needed in the link forms was cut out and pressed into a thin web between the future links. Further operations stamped out this thin web of waste material and pressed the links into shape. This was by far the most interesting process devised for the production of weldless links and a large amount of money was invested in a large rolling plant before it was found that the process was too expensive to permit the product competing with chain made by other processes. While each of the processes devised successively by Rongier and Klatte improved on the previously introduced process, it must be admitted that none of them proved worthy of commercial recognition, due to the multiplicity of operations and their attendant expense. In the Oury, Rongier and Klatte processes alike, it will be noted that by none of them was it possible to produce more than a limited length of joined links and to join these short lengths together by a welded link was

to subject the entire chain thus made to the same objection of uncertainty of safety as in a chain composed entirely of welded links, the strength of a chain being only that of its weakest link. To overcome this objection, it was found practicable to join the lengths of weldless chain by a "volute" or ring made up of a spiral of a smaller material, wound around and the convulutions of which were afterwards pounded closely together and welded in a mold, sometimes covered by a sheet of metal. This patent wound link was shown to possess a strength far superior to that of a welded link and nearly equaling that of the weldless links.

Following out this idea, Mr. Arthur Crawshay, in 1889, secured a London patent on a machine for the manufacture of chains by winding through the previously formed link, each successive link, formed by the superposed coils of smaller material, these coils to be interlaced, pressed closely together and welded in a mold, die or similar manner. Following up the Crawshay idea, a number of interesting experiments were made for the purpose of securing a machine that would permit a continuous series of links being formed by the rolling of a smaller section of material into a close wound spiral, which was to be welded and shaped into link form. That such a process has been found is the belief of a number of interested experts who have made a careful examination of the Lelong chain machine, which it is the purpose of this article to describe.

Monsieur E. Lelong, a prominent engineer of Brussels, Belgium, the center of chain manufacture in that country, after many experiments, succeeded in evolving a machine which produces, in one heating and with great rapidity of production, chain links rolled, welded and shaped from an initial thin bar of material, without leaving the machine until completed and without being handled, save mechanically from the time the material is fed into the machine until the finished chain still hot, leaves it.

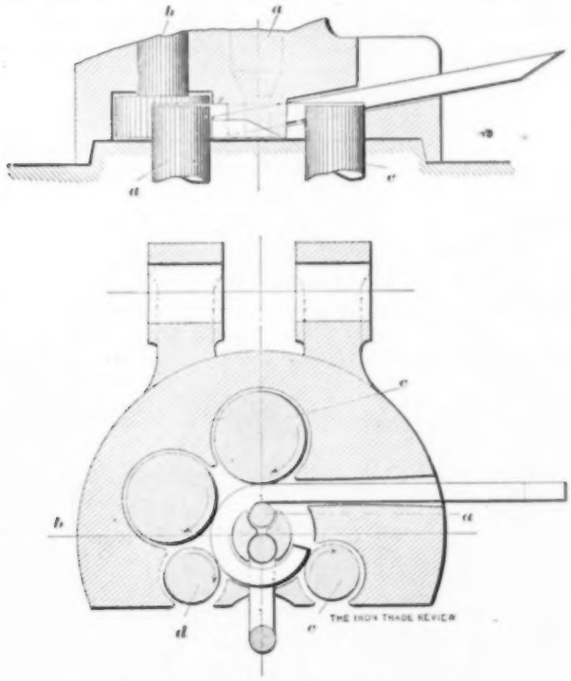


FIG. 1.—CAP AND ANVIL OF LELONG CHAIN MACHINE.

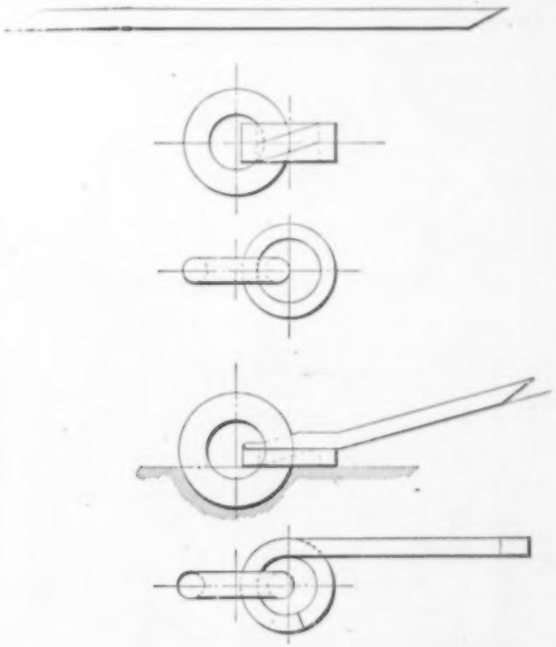


FIG. 2.—INITIAL BAR AND SUCCESSIVE OPERATIONS IN LELONG CHAIN MACHINE.

Instead of a tranverse welding across the overlapped beveled end of the link, as formerly, the welding is accomplished longitudinally around the superposed coils of the closely wound material. The material from which the links are formed is steel procured in a pre-determined length and size to form the desired link with the least possible waste. Instead of rolling material into a bar of iron or steel, cutting this bar into pieces, and welding each piece into a chain link, the material is now rolled directly into the link in the same manner as a bar or rail is rolled.

For the manufacture of a Lelong link of 5/8-inch diameter, which we will use as an example, a piece of steel 1/2 inch by 3/8 inch by 18 inches is used, weighing 10.65 ounces; this rod at a welding heat is fed directly from the heating furnace into the machine, where it is rolled into a rough ring 1¾ inches in diameter, 7/8 inch wide and 3/8 inch thick and then joined to the previously formed link. The anvil on which the link is forged is a constituent part of the machine and is surmounted by a cap, containing the machinery for forming the ring. It is shown in Fig. 1 in plan and sectional elevation. Fig. 2, shows the initial bar of material with scarfed ends, and the method of winding this material into a ring formed of a coil of closed spirals.

The cap contains two cylinders, *a* and *b*, one of which, *a*, acts on the inside of the ring in forming it, while the other, *b*, serves as a mold for the outside of the ring. This cap further contains sockets in the lower surface of its face, to receive the cylinders c, *d* and *e*, which rise from the anvil and enter the sockets of the cap when the latter is resting on the anvil. The cap is arranged on the anvil on a hinge, which enables it to be raised and deposit the ring just formed, on the face of the anvil, between the cylinders *c*, *d*, and *e*, there to be welded and molded. After having served to form the ring, these cylinders arising from the anvil can be brought together or separated at the will of the workman, so as to turn out a continuous chain or deposit separately the ring to be forged on the anvil. After the rough ring has been formed in the cap, in less than a second, the cap is raised and the ring deposited on the anvil and a few blows of a steam or compressed air hammer, which is an

integral part of the machine and operating at a speed of 400 blows per minute, suffice to weld and form the rough ring into a circular ring of 5/8 inch round section.

The finished ring is then displaced without leaving the machine and enclosed between dies operated by hydraulic pistons, where it is shaped into the required oval shape and kept in a suitable position while the succeeding link is being joined thereto by the process above described. These operations take place consecutively and rapidly, the production being from two to three links per minute. The finished link weighs 10.33 ounces, showing a waste of about three per cent, while the waste of heating may be assumed at two per cent, making a total waste in manufacture of five per cent against ten per cent by other processes.

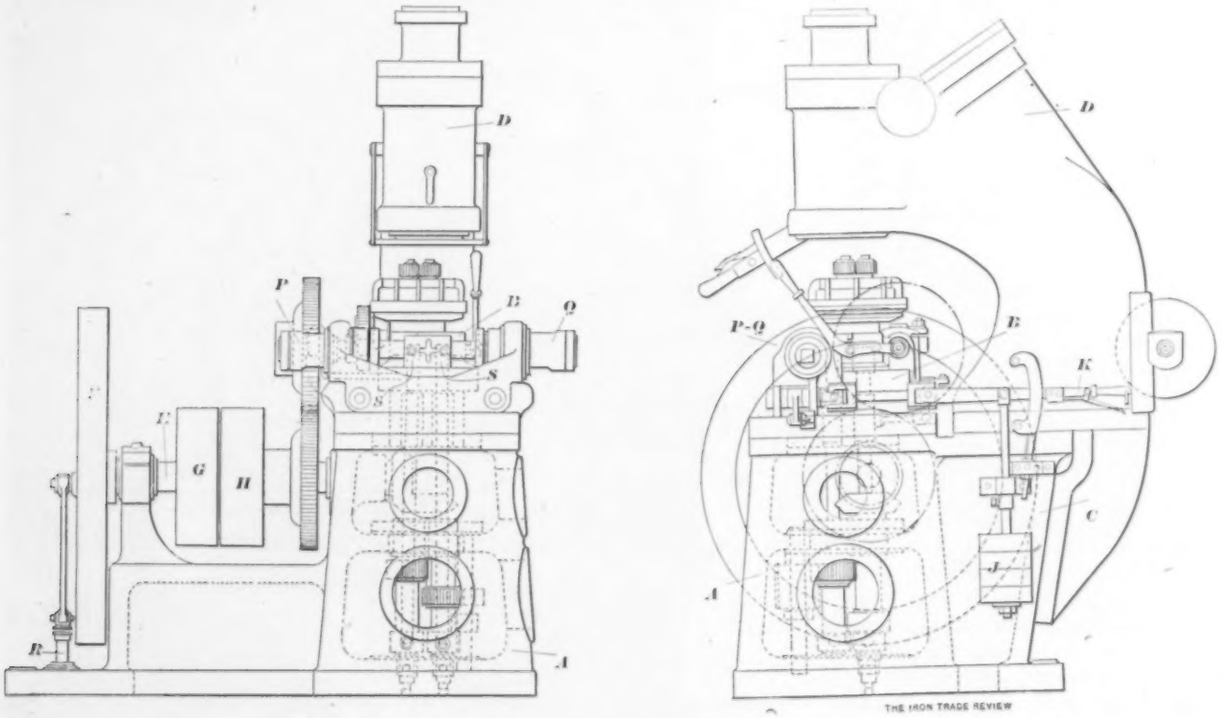


FIG. 3.—LELONG CHAIN MACHINE.

Figs. 3 and 4 show the Lelong machine, equipped with an automatic hammer, operated by compressed air, the erection of which is made in one piece, comprising three parts. The pedestal A, on which is placed the anvil B and which contains the controlling part of the mechanism for making the spiral or volute; the support C for receiving the hammer of the forge D; and the flap with a ledge for receiving the beam of transmission E with a fly-wheel F, loose pulley G and fixed pulley H. The control contained in the pedestal sets in motion the three vertical cylinders *a*, *b*, and *c* in Fig. 1, which cross the anvil in sockets conveniently made. These cylinders can be set in motion according to the phase of the work, either by counterweights, J, Fig. 3, or by hand, by lever K, so as to bring them together or separate them at will, from the center of the anvil. For this purpose they are joined by a system of levers shown at L, M, and N, Fig. 4, causing equal displacement of the cylinders, according to the molds arranged in the erection. On the piece crowning the erection are placed two hydraulic cylinders, P, Q, set into motion by an accumulator and pressure pump R. The pistons of these cylinders are provided with heads or molds S, of shape and dimensions suitable for keeping the links when made, in good position while being worked, and for giving them the requisite shape.

A system of gearing gives to the cylinders contained in the cap, a rotary movement, connecting in an invariable manner with the cylinders crossing the anvil. In the Lelong process, the welding of the link, instead of being confined to one point, either the side or the end of the link, is divided all around the circle of the link. Even if a perfect weld does not exist the entire length of the coil of material, if only the two ends of the bar are welded where they join the coil, the balance of the coil being forged into close unison, a link of superior strength is resultant, superior to the best end welded chain links. Tests made of Lelong chain show an average tensile strength of link of about eighty per cent of the double section of bar employed, against fifty per cent by other processes. It is also possible to produce on this machine, aside from the links already described which are made up of the superposed coils of material of small size, chain links formed of material of approximately the same size as the desired link, by shortening and increasing the size of the initial rod, and cutting a long bevel or scarf on each end, so that the rod is rolled once only, the long bevels lapping over each other and extending around possibly a third of the circumference of the link. By subjecting the ring thus formed to the rapid blows of the steam hammer, a satisfactory end welded link is formed, similar to but improving on that produced by the present known process. This method is shown in Fig. 5.

In comparing the Lelong process with the present known process, it is perhaps advisable to consider the details of chain manufacture existing before the introduction of the Lelong process. Chain manufacture is primarily divided into two distinct classes, hand-made and machine-made. Hand-made chain is made by the old style "off the rod" process, while machine-made chain is made by a process in which the hand labor is assisted, but not displaced, by the introduction of labor saving machinery. In the manufacture of 5/8-inch chain by the old-fashioned hand-made process, we find

that the smith cuts from a long bar of 5/8-inch material, a piece of sufficient length to form a single link. This is placed in the fire and heated to a cherry red, and then withdrawn and bent into a U shape over the horn of the anvil. It is then replaced in the fire until the ends of the U shaped link reached a white heat, where it is again withdrawn, laid flat on the face of the anvil and one end scarfed. The link is then turned over and the other end treated in a similar manner, but in the opposite direction, so that when the ends are bent around towards and lapping over each other, the scarfed ends meet and being pounded together, form the continuous chain link.

Placing the link back in the fire for the final and welding heat, it is withdrawn when the proper heat is reached, and the weld accomplished by a number of hammer blows on the joined ends. The successive links are hooked through the link previously made before the ends are bent around and so on.

In this manner some 200 pounds of common quality chain can be made per day, at an approximate cost of $4.70 per 100 pounds (see Table I.) while in the making of higher grades for use on cranes, with links shaped to certain required dimensions in order to fit in the pockets of a wheel, a smaller amount was made per day at a correspondingly higher cost (Table II).

As the demand for chain increased and competition grew keener, much labor-saving machinery was introduced to increase the output and decrease the cost.

First a hammer arm was attached to the anvil and operated by a foot treadle, to assist the smith in perfecting the link. Then dies were introduced, the upper die being attached to the lower part of the head of the hammer arm and the lower die fastened in the face of the anvil, in order to reduce the stock of the link at the weld and assist in imparting uniformity to the link. Finally the hammer arm, instead of being operated by the foot treadle, was operated by power driven machinery and the material, instead of being cut off and bent into shape by the smith by hand, was wound into a spiral or close wound coil of links and cut into separate link forms by a power driven cutter, which resulted in supplying the smith with wound and cut links, scarfed and ready for welding, which was done by a power-driven die-carrying hammer. By these means the daily output was increased to 600 pounds of 5/8-inch chain, at a correspondingly lower cost of $2.75 per 100 pounds (Table III.). The latter, however, presents the production and cost of the cheapest grade of common chain, which is not used for any purpose where strength, durability, elasticity or uniformity of link are required. In a comparison of production and costs of the different processes, it is worthy of note that the Lelong process, in producing 735 pounds per day of 5/8-inch chain, at a cost of $2.50 per 100 pounds. (Table IV.) exceeds the daily production, and at a lower price, of the cheapest grade of machine made chain made by other processes, resulting, however, in a product that ranks ahead of the hand-made process in strength, durability, elasticity and uniformity of link, and at a saving of $3.20 per 100 pounds.

The main wear of a chain link, in fact, practically its only wear, is at the ends of the link, where it bottoms with its joining link and where the weld occurs in ordinary welded chain. By distributing the weld over the entire circle of the material, as in the Lelong chain, it results in a link as strong at the points of most wear, as at any other portion of the link, thus imparting to the chain the necessary qualifications of safety demanded of high grade chain. In other processes, as the size of the chain increases, the production per day in number of links decreases rapidly. In the Lelong process, however, as the size increases, a very slight reduction of the number of links produced per day is noted. Thus in the manufacture of larger sizes of chain, the number of links and consequently the daily production in pounds, maintains a greater increase over that produced in other processes, thus showing a still larger saving in cost of production by the Lelong process over other known processes, as the size of chain being made is increased.

M. Lelong produces three machines for the manufacture of all sizes of

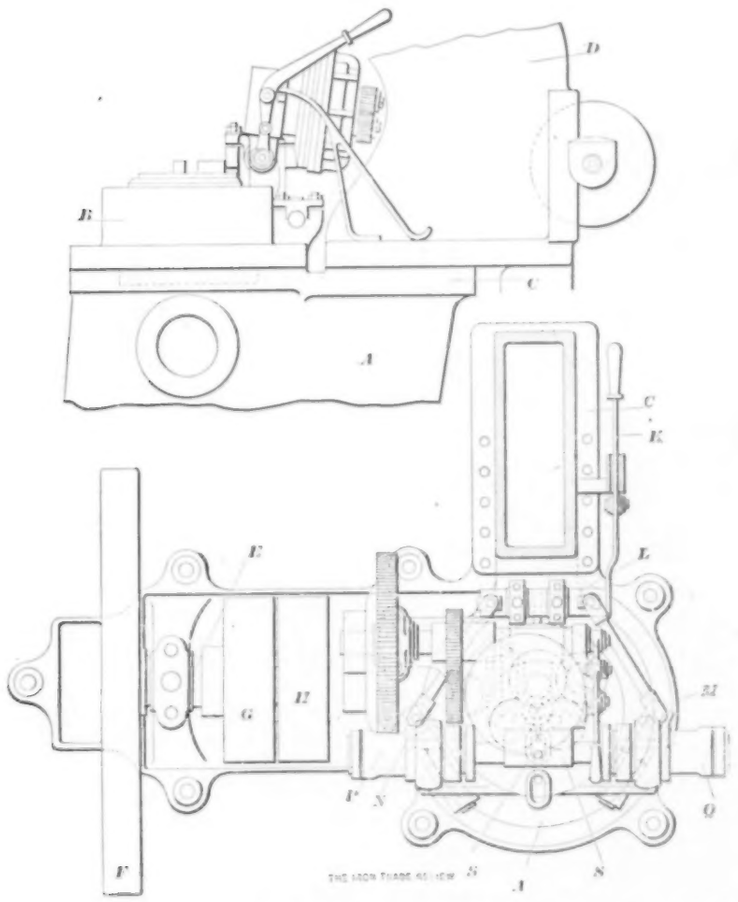


FIG. 4.—PLAN OF LELONG CHAIN MACHINE AND DETAIL OF CAP AND ANVIL

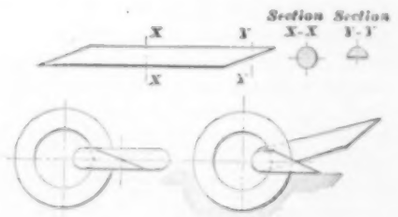


FIG. 5.—LELONG CHAIN LINK OF ONE THICKNESS.

chain, from the smallest size up to 4-inch chain and over. Machine No. 1 rolls up to one inch, No. 2 rolls up to two and one half inches and No. 3 up to four inches and over, a slight exchange of inter-changeable tools being necessary to produce on one machine the inclusive sizes. Each machine requires the services of two men, one of whom operates the forging mechanism, while the other attends to the heating of the material and feeding it into the machine. Owing to the simplicity of the machine and its operation, skilled labor is not essential for its satisfactory operation.

TABLE I.

HAND MADE ¾-INCH COMMON QUALITY CHAIN.

Average production per day in pounds	200 lbs.
Average production per day in feet	50 ft.
Average production per day in links	340 links
200 pounds steel @ $1.50 per 100 lbs.	3.00
Average waste in manufacture 10 per cent	.30
Fuel, 8 bushels of coke @ 10c bu.	.80
Cost of welding	3.50
Expense 50 per cent of welding cost	1.75
	9.35
Cost per 100 pounds of finished chain	$4.70

TABLE II.

HAND MADE ¾-INCH CRANE QUALITY CHAIN.

Average production per day in pounds	150 lbs.
Average production per day in feet	34 ft.
Average production per day in links	240 links.
150 pounds steel @ $1.50 per 100 lbs	2.25
Average waste in manufacture 10 per cent	.23
Fuel, 8 bushels coke @ 10c bu,	.80
Cost of welding	3.50
Expense, 50 per cent of welding cost	1.75
	8.53
Cost per 100 pounds of finished chain	$5.70

TABLE III.

MACHINE MADE ¾-INCH COMMON QUALITY CHAIN.

Average production per day in pounds	600 lbs.
Average production per day in feet	144 ft.
Average production per day in links	980 links
600 pounds of steel @ $1.50 per 100 lbs.	9.00
Average waste in manufacture 10 per cent	.90
Fuel, 8 bushels of coke @ 10c bu	.80
Cost of welding	3.00
Expense, 50 per cent of welding cost	1.50
Winding and cutting links @ at 20c per per 100 pounds	1.20
	16.40
Cost per 100 pounds of finished chain	$2.75

TABLE IV.

¾-INCH CHAIN MADE ON LELONG MACHINE.

Average production per day in pounds	735 lbs.
Average production per day in feet	175 ft.
Average production per day in links	1,200 links
735 pounds steel @ $1.50 per 100 lbs.	11.02
Average waste in manufacture 5 per cent	.55
Fuel, 16 bushels of coke @ 10c bu.	1.60
Cost of welding { One man at $2.00 day ; One man at $1.50 day	3.50
Expense, 50 per cent of welding cost	1.75
	18.42
Cost per 100 pounds of finished chain	$2.50

British Ship Building.—At the close of the quarter ending March 31, 1906, there were 547 vessels of 1,401,882 tons gross under construction in the United Kingdom, according to returns compiled by Lloyds "Register." This was exclusive of warships. This tonnage is within 12,000 of the total reached in Sept., 1901, which is the highest on record.

The demand for fencing wire in Australia is so heavy that stocks have been practically all sold or withdrawn from sale pending a probable raise in prices. Telephone wire is also in great demand at advanced rates.

THE GRINDING OF ACCURATE DUPLICATE TOOL STEEL PARTS.

BY JOSEPH. V. WOODWORTH.

The fixture illustrated in three views in Fig. 1 typifies a class of fixtures or intricate manufacturing tools which have come into use to assist in the cheap production of accurately hardened and ground small interchangeable parts of tool steel.

As the fixture illustrated possesses many adaptable features, and also comprises several ingenious combinations of movable parts, which combine to assist in and facilitate the expeditious locating and presentation of the work to the emery wheel, it is well worthy of a detailed description and also of the reader's interest.

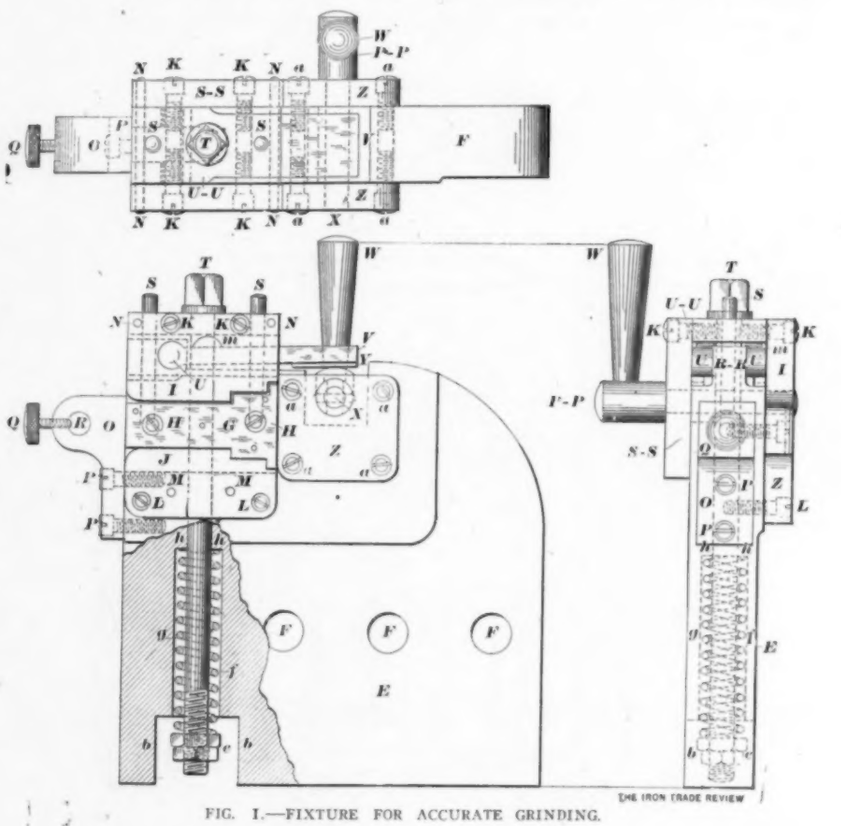


FIG. 1.—FIXTURE FOR ACCURATE GRINDING.

In Fig. 2 are shown two diagrams representing a plan and an edge view respectively of the work as it appears after grinding. The dotted line indicates the amount of stock removed by the milling operation—which follows the punching of the blanks—and the grinding operations. As the amount of stock removed in the last grinding operation is considerable—0.020 inch, a steady and swift flow of water against the work is necessary.

As mentioned above, the first operation in the production of the parts was that of punching, the blanks being produced in a sectional die which sheared them to the shape indicated at CC, DD and B. Then a taper cut was taken in the miller off what was to be the inclined side, after which the blanks were hardened and tempered, when the grinding was in order. Both sides were ground, the flat or straight side first and the taper side last. The fixture for the first grinding was exactly similar—except for the tapered seat—to the one illustrated herein.

From the very shape and size of the parts to be ground it will be at once obvious that the main requirement in the fixture for holding them during the grinding operation, are positive locating and secure fastening, as any slip backward or forward on the part of the article during the grinding operation would so affect the resulting taper and thickness of the work as to make the product valueless. By keeping these requirements in mind an ideal grinding fixture was evolved and used successfully.

In Fig. 1, as will be seen, the body *E* of the fixture, is a casting of sufficient bulk and strength to insure its rigidity and positive alignment when fastened to the cross slide of the grinder by bolts through holes, *F, F, F.*

The locating and holding, or clamping, arrangements are constructed of tool steel parts throughout, with all banking and clamping surfaces hardened and carefully ground and lapped. *G* is the taper banking plate upon which the work

is seated. The face of this part is tapered to the required degree, and it is fastened to a mechanical surface on *E* by means of the fillister-head screws *H H* and four dowels. Its general shape is similar to that of the work, Fig. 2, and its size is a trifle over 1-32 inch less at all

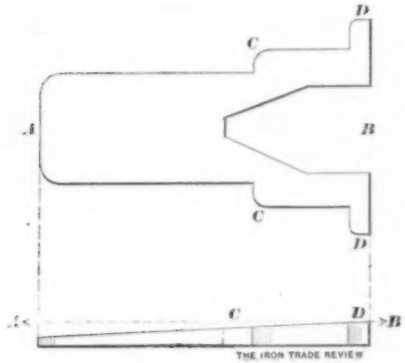


FIG. 2.—THE PIECE TO BE GROUND.

points. *J* is the bottom banking plate against which the side of the work is clamped, and it is likewise located and fastened to *F* by dowels, *M, M,* and screws, *L L.*

The means depended upon and utilized for clamping and forcing the work tightly against the banking surfaces and into the locating seats are clearly indicated in the three views. They consist of tool steel plates, *I, S S,* and *U U,* which straddle the body casting *E,* and fit the sides of it snugly and without play. The four fillister head screws, *K K K K,* the dowels, *N N,* the two locating studs *S S* align the plates and keep them in the proper relative position to the other parts.

The long square headed bolt T passes down through the plate *U U* with its shouldered head resting upon it, then down through the entire depth of casting *E* and is sustained therein by means of nuts and springs.

The front view in Fig. 1 shows the spring arrangement which causes the straddle plates to descend and clamp the work. *b b* is a clearance channel milled in the bottom of *E* to accommodate the nuts *e* and to also allow of using a wrench to adjust them. The bolt body is designated by *g,* and *f* is a strong, tempered steel spring, which rests against the shoulder *h h* and nut *e.* As the spring arrangement is sufficiently strong to cause the plate *I* to descend and clamp the work securely, means which allow of raising the plate quickly and easily are necessary. This is accomplished by means of the parts shown in the three views, and which are connected at the top of the fixture. *V* is a lever hinged in *E* at *U U,* and *R R* in the end view, with a clearance hole in it for the shank of the bolt to pass through. It has two hardened lugs at *M M,* which engage the inner side of the plate *U U.* This hinged plate or lever extends out to *V* in the front view, and rests upon an eccentric, *Y.* This eccentric is hardened and is located by a pin on shaft *X,* which is in turn located in plates *Z* and *S S,* and is actuated by means of lever *W* in the protruding end *P P.*

The bracket *O,* of machine steel, which is fastened to the back end of *E* by screws *P,* is used to facilitate the trimming of the emery wheel face, a diamond being used, and the holder inserted through hole in *O* and fastened by means of knurled head screw *Q.* By this simple arrangement a perfect alignment between the face of the wheel and the fixture was secured at will with ease.

When in use the fixture is fastened to grinder cross slide facing the cup-shaped emery wheel. Lever *W* is then pulled to a vertical position, as shown in Fig. 1;

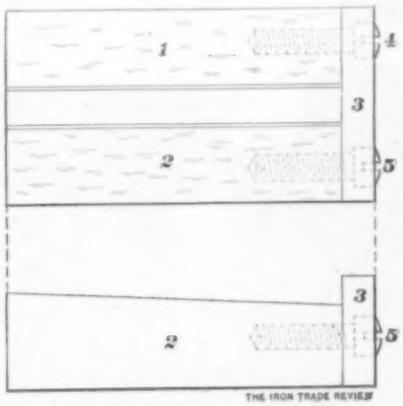


FIG. 3.—SECTIONAL TEST BLOCK.

the part to be ground is held by the operator against *G* and *Z;* the lever *W* is pulled down, and plate *I* instantly descends and clamps the work securely in

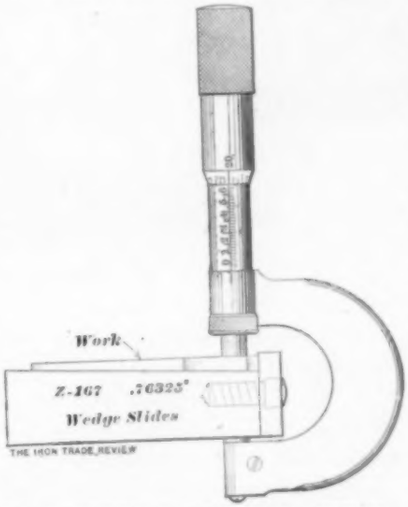


FIG. 4.—METHOD OF TESTING BY MICROMETER.

position. To release the ground part, upon the return of the cross slide of the grinder to the front of the machine, and to locate another part in its place, the movements outlined above were repeated.

The manner in which the finished parts are gauged or inspected after the taper side is ground is indicated in Figs. 3 and 4. Fig. 3 shows two views of the accurately ground, sectional test block used for the seating of the work; and Fig. 4 shows the manner in which the commercial micrometer is utilized in the testing. The taper of surfaces 1 and 2 of Fig. 3 is the same as that of the work. The accuracy of the finished parts and their interchangeability is ascertained by using the micrometer on all four corners of the work successively. The combined thickness of the gauge block and the work at any given point must be the same as at any other point.

MEXICO SUFFERING

From Car Shortage Though Rolling Stock is Ordered From United States.

(Special Correspondence.)

Mexico City, Mex., April 27.—A car shortage of unusual proportions is causing serious inconvenience to shippers in this country, practically every railroad suffering. In some instances delays have been so extensive as to prove extremely costly to shippers. Heavy orders for equipment have been placed with car manufacturers in the United States, but these stand little chance of being filled at an early date because of the congested condition of car building plants.

An important railway project has come to light through the action of the Mexican government in granting to a British syndicate concessions for the construction of a transcontinental railroad running across Mexico from Tuxpan on the Gulf to the port of Navito on the Pacific. The line will be 600 miles in length and will traverse the country where railway facilities are now entirely absent.

Canadian capital is seeking an entrance into this country and it is announced that an agency of the great Bank of Montreal is shortly to open a branch agency in this city. Although American and European capital predominates here, Canadians are largely interested in various projects and a further development of Canadian trade with this country and of Canadian investments here is expected as the result of a new steamship line for which a subsidy has just been granted.

The Mexican Coal & Coke Co. reports gross earnings for 1905 as $1,499,890 against $1,542,055 in 1904 and $1,217,442 in 1903. The net earnings and surplus for 1905, however, are smaller than during the two preceding years.

THE BAUSCH MULTIPLE SPINDLE DRILL.

In the accompanying illustration is shown a multiple spindle drill designed for the rapid drilling of automobile crank cases, cylinders, pumps, etc., and electrical slate work. It is built by the Bausch Machine Tool Co., of Springfield, Mass., and is known as the No. 10 multiple drill. The capacity of the machine is sixteen 3-16 to ½ inch holes in cast iron or steel. It will drill ½ inch holes in cast iron to a depth of one inch in twenty seconds. Either high speed or carbon steel drills may be used, a two-speed counter-shaft furnishing the requisite difference in speed. The rectangular capacity of the head is 16 x 20 inches. The machine can also be made with circular heads up to 16 inches in capacity.

The spindles are of tool steel, and run in composition bearings. Each bearing has a vertical adjustment of 13-16 inches for each spindle. The head is counterbalanced on the column, and is operated by a rack and pinion. It also has three gear feed changes operating in connection with a quick reverse mechanism. An automatic knock off is provided which enables the operator to drill to any required depth.

On the column is an adjustable table, which may be raised and lowered by hand with a rack worm and hand wheel. The base of the machine is planed, so that if it is required to drill long work, the adjustable table can be removed from the column, and the work allowed to rest on the face of the base. All shafts and spindles of the machine are ground, and the countershaft brackets have babbitted bearings with ring oilers. All bearings of the tool are composition lined. The tool is capable of drilling on a circle, square, or any irregular lay out within the capacity of the head. The more important dimensions of the machine are given in the following table:

No. of spindles	16 or less.
Vertical adjustment of arms	13-16 inch.
Size of holes	3-16 to ½ inch.
Least distance from center to center of spindles	1¼ inches.
Longest layout, centers of spindles	16 x 20 inches.
Greatest distance from table to end of spindle	28 inches.
Greatest distance from spindle to bed	43 inches.
Least distance from table to end of spindles	4½ inches.
Distance from face of column to center of head	13 inches.
Vertical travel of table	16 inches.
Size of table	18 x 24 inches.
No. of steps on cone	3.
Diameter of largest step	18½ inches.
Width of belt	4 inches.
Floor space required	66⅞ x 40 inches.
Net weight of machine and countershaft	3,600 pounds.

BAUSCH MULTIPLE SPINDLE DRILL.

A PORTABLE VISE STAND.

The Western Tool & Mfg. Co., Springfield, O., has placed on the market a portable vise stand for use in machine shops, round-houses, assembling rooms, etc.

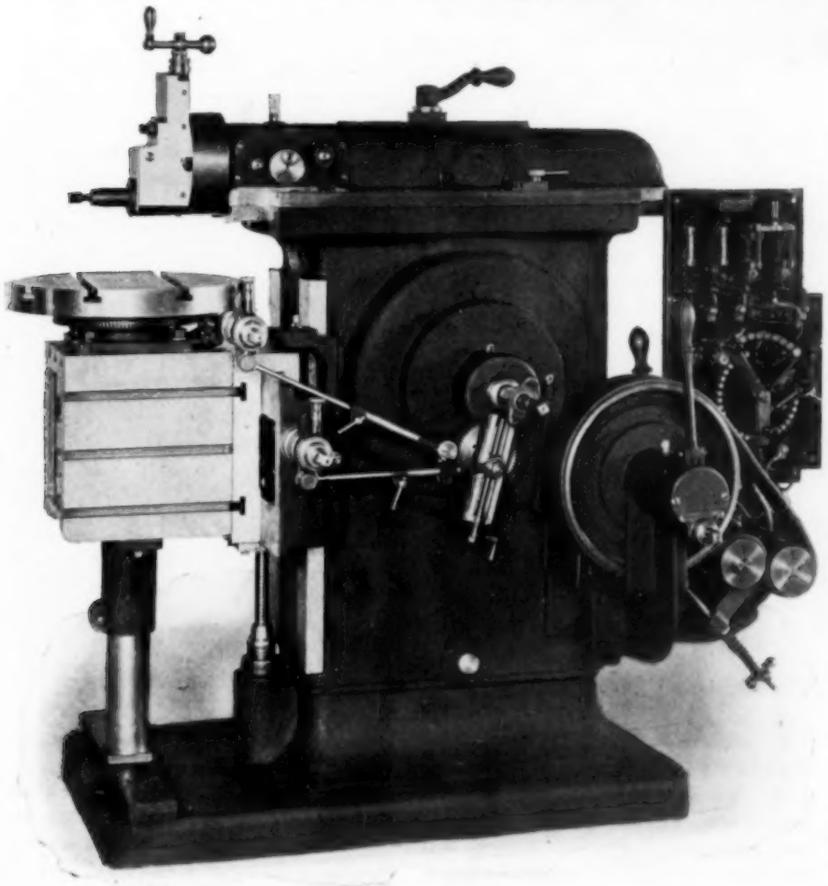
PORTABLE VISE STAND.

This stand follows out the present, modern idea of moving the tools to the work instead of the work to the tools. It has recently been improved, and is designed for moving around the shop to any place where a bench is needed to do filing or fitting. Instead of carrying a pile of castings to a bench, the stand, which in reality is a movable bench, is taken to the castings, and when that job is completed, it is moved to the next. The stand can be loaded down with work and the bench and vise moved to the lathe, planer, etc. It finds a particularly valuable application in locomotive round-houses and repair shops. These shops are usually so built that the regular benches along the walls are usu-

ally a considerable distance from the work, and in the aggregate, considerable time is consumed going to and from them. Due to the same reasons, it is valuable in erecting shops or other places where much work is being assembled. The stand is heavy enough to be rigid and large enough to be serviceable. It is provided with a good sized base with sufficient weight to hold it steady. The rear wheels are provided with a brake, so that the stand is very substantial and can be used for filing. When the handle is pulled forward, the front wheel is thrust into operation and the brake released from the rear wheels. The device weighs from 300 to 600 pounds.

A TWO-PIECE CRANK SHAPER.

The accompanying illustration shows a 16-inch two-piece crank shaper recently placed on the market by the Stockbridge Machine Co., Worcester, Mass.



STOCKBRIDGE CRANK SHAPER.

The tool is motor driven and a special feature to which the maker wishes to call attention is the arrangement of the motor and driving pulley. It will be observed that an idler pulley is arranged so as to give the driving belt a large wrap around the driven pulley. The idler is connected to the driving pulley by means of gears. This renders the idler also a driving pulley, for if the main driving pulley should slip, the idler would be in position to exert a pull on the belt. The motor has 300 per cent speed variation through field control and gives, with the back gears, 52 changes of ram speed. The ram can be stopped or started in any position without stopping the motor. If desired, the machine is built with a silent chain drive instead of a belt.

The column is of the box pattern, and is extended 2½ inches. The bearing surface of the ram is 26 inches. The ram is of the box pattern, well ribbed and of great strength. The head is swiveled, can be set to any angle and is held in positon by two bolts. The slide has a travel of 5½ inches, and is provided with or without automatic feed, as desired. The screw is provided with a graduated circle reading to sixty-fourths of an inch, and can be set at zero at all times without regard to position of the screw.

The table is of the box form and is provided with a top working surface 10 x 11½ inches. The side surfaces are 11½ x 12 inches. All faces have 3 T-slots for clamping work. The table can readily be removed from the saddle, if desired, the latter being provided also with T-slots for holding work. The vertical movement of the table is 14 inches, and a support is furnished, if desired. A new feature of the machine is the circular table. As illustrated the arrangement allows for circular feed, and at the same time, cross feed, or either feed separately. The circular table is used for planing arcs and odd shaped pieces that could not be readily turned up on a lathe.

The stroke is uniform the entire length and has a quick return of 4 to 1. The machine has a cross feed 22 inches in length and which is automatic in either direction. The rocker arm is made so that a 3-inch shaft can be passed through underneath the ram for keyseating.

The more important dimensions of the machine are comprised in the following table:

Length of stroke	16½ inches.
Vertical travel of table	14 inches.
Horizontal travel of table	22 inches.
Feed to head	5½ inches.
Top of table	10 x 11½ inches.
For keyseating, takes shaft	3 inches.
Vise opens	7 inches.
Size of vise jaws	9½ x 2 inches.
Finished weight of machine with motor	2,400 pounds.

SOME SHAPER ATTACHMENTS.

In the accompanying illustrations are shown some attachments for shapers brought out by the John Steptoe Shaper Co., Cincinnati.

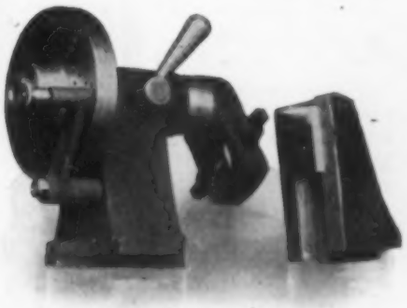


FIG. 1.—PLAIN INDEX CENTER.

Fig. 1 illustrates a plain index center, Fig. 2 an index center with worm feed and Fig. 3 an automatic full swing circular attachment. The index centers while especially designed for shaper work can also be used on either a milling machine, a planer or a drill press. They will swing work up to a diameter of 10 inches, and can be made to take any length between centers up to 11 inches. The devices are made of substantial proportions and will hold rigidly any work within their range. The back center can be raised or lowered in order to plane taper work.

With the index center with worm feed, the worm and gear for turning

and holding the headstock spindle relieves the index pin and holes of all strain and incidentally of the attendant wear and loss of accuracy. If desired, the worm can be instantly dropped out of gear when a quick turn of the dial is needed. The dial is accurately

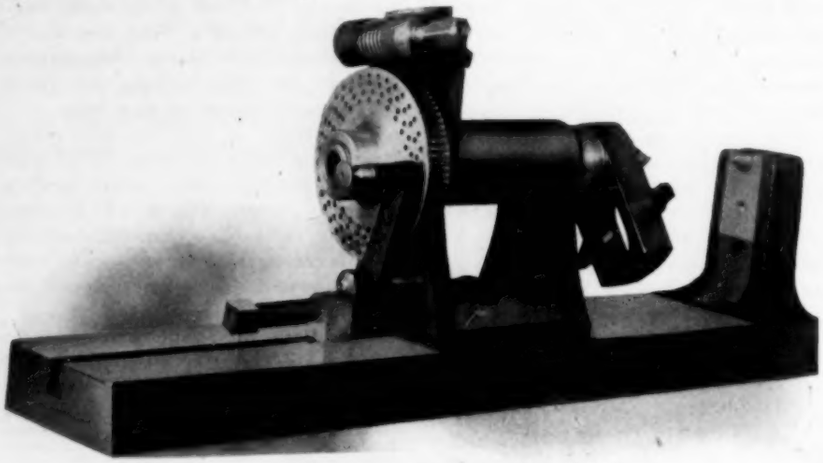


FIG. 2.—INDEX CENTER WITH WORM FEED.

drilled with the following number of holes: 24, 28, 30 and 36. The weight of the index center with worm feed is 94 pounds.

The full swing circular attachment

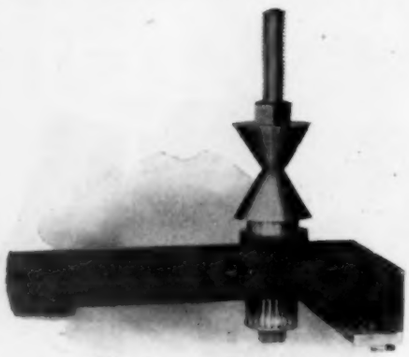


FIG. 3.—CIRCULAR SWING ATTACHMENT.

shown in Fig. 3 can be applied to the cross rail of any of the shapers built by the John Steptoe Shaper Co. The worm gear in the back engages the cross rail screw, thereby feeding automatically. When desired, the feed for the cross rail screw can be disengaged by turning a spring button and the feed can then be operated by hand by means of the crank on the end of the screw. For exceptionally heavy work, a support for the outer end of the arbor can be furnished.

The Lackawanna Steel Co. established a new high record in unfilled business April 1. The earnings of the corporation are larger than they have been at any time since its organization.

"AMERICAN" GEARED HEAD ENGINE LATHE.

The American Tool Works Co., Cincinnati, manufactures the geared head engine lathe shown in the accompanying illustration. The machine shown is the 20-inch size. In this tool, mechanical speed variation is obtained through an all-geared headstock of high power. The machine is belt-driven, the belt speed being figured with a maximum economical limit, which provides a maximum efficiency for any belt width. The gears in the headstock are of wide face and coarse pitch and are designed to transmit the maximum power delivered by the belt.

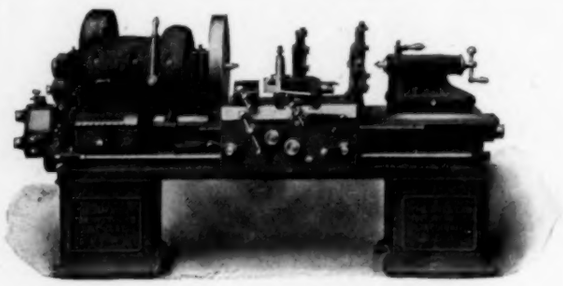
The headstock is a complete unit and of simple and powerful construction. Six gears only are required for the four mechanical speed changes. The gears are located in the head in the place usually occupied by the cone pulley, and are oppositely disposed on the spindle and driving shaft. The four speed changes cover a wide range and are calculated for the greatest efficiency: They can all be obtained by a clutch and lever mechanism. The levers are conveniently placed at the front of the head. The necessary adjustment for any desired speed can readily be determined by reference to an index on the front of the head.

The driving pulley is mounted on the back or driving shaft, and so placed that the belt may be removed at any time without unlacing. It is furnished in various diameters, and widths of face depend upon conditions. This machine may be readily converted to a motor-driven lathe by removing the driving pulley and mounting any type of variable speed motor above the headstock, connecting it to the driving shaft through spur gears or silent chain. In addition to the all-gear speed change device, this lathe is equipped with a rapid change gear mechanism, providing a wide range of changes for feeding and screw cutting, each change being available while the machine is in operation without the removal of a single gear.

The bed is of the drop-V pattern, the two inner Vs being lower than the two outer ones. This permits of the lathe swinging a larger diameter than its nominal size calls for. It also places an exceptional amount of metal in the bridge of the carriage.

An idea of the performance of this lathe may be gained from the following:

One of the 20-inch type designed to rough out spindles removed 2¼ inches of metal, 1-64-inch feed at 50 feet per minute from a 5½-inch diameter of crucible steel. Two tools were used, each taking a 1⅛-inch cut. The lathe shown is able to remove seven pounds of cast iron per minute.



"AMERICAN" GEARED HEAD LATHE.

Some of the principal dimensions of this machine are as follows:

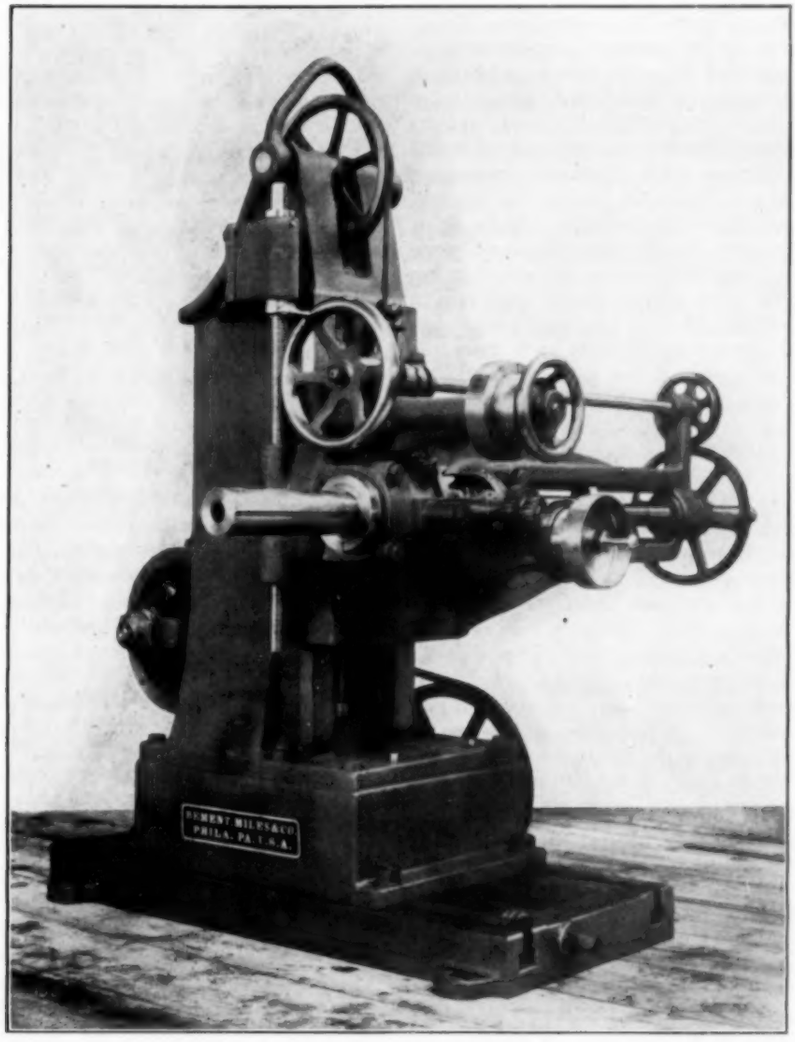
Standard length of bed	8 feet.
Maximum length of bed	24 feet.
8 feet bed turns between centers	4 feet 1 inch.
Swings over Vs	22½ inches.
Swings over carriage	14½ inches.
No. screw cutting changes	44.
Range of threads per inch	2 to 32.
Range of feeds	8.8 to 140.
Velocity of belt	860 and 1420 feet per minute.
Speed of counter shaft revolutions per minute.	206 and 338
Horsepower delivered by belt	8 and 13.

According to Vice President Drummond, the Lake Superior Corporation has booked orders aggregating 186,000 tons for the Algoma steel rail mill during the last few months. Of this 61,000 tons for the Canadian Pacific has been delivered.

A PORTABLE HORIZONTAL BORING AND DRILLING MACHINE.

A portable horizontal boring and drilling machine has recently been designed by the Niles-Bement-Pond Co., 111 Broadway, New York. This machine has been designed in view of the increased use of floor plates in shops where large work is handled. The tool can be lifted by a crane and placed in any position on the floor plate, it being frequently more economical to take the machine to the work than to take the work to the machine. The tool is stiff and substantial and capable of taking heavy cuts. It is motor driven, the motor being attached to the back of the column, as shown, thus making the machine entirely self-contained.

The spindle is 3⅞ inches in diameter and has a 25½ inch traverse. The counterweighted saddle has 18 inches vertical adjustment on the column. The column, itself, has a 23½-inch traverse on the base. The machine is driven from the motor by means of a silent chain and beveled gear drive.



PORTABLE HORIZONTAL BORING AND DRILLING MACHINE.

William B. Scaife & Sons' Co., Pittsburg, Pa., manufacturer of We-Fu-Go and Scaife water softening and purifying systems, through the courtesy of a manufacturing concern operating a 2,000 horsepower boiler plant, was allowed the privilege of photographing two pages of its ledger. These two pages show the cost of operating this boiler plant with and without a water softening and purifying system. The savings effected were far beyond the expectations of this user. These photographs have been reproduced in color and embodied in a folder, the outside having the appearance of a ledger, which is now being distributed.

BOOK REVIEW.

"Steam Turbines" by William Gentsch. Translated from the German by Arthur R. Liddell, New York. Longmans, Green & Co. 375 pages. Numerous illustrations and 19 plates. 7½ x 10 inches. Cloth. Supplied by THE IRON TRADE REVIEW for $6.00.

The author of this book states in his preface that he has endeavored to treat the subject of "Steam Turbines" in a popular manner, and, so far as possible, to cover all the ground. He has endeavored to divide the systems of construction hitherto known into two groups, for which two designations have been made use of—those of "Velocity Turbine" and "Pressure Turbine." The book has an introductory chapter comprising a short historical discussion of the steam turbine, and giving its classification under the author's system. The various forms of turbines in both classes are taken up and described, and then the description deals with the parts more in detail. The scope of the book can be determined by a glance over the more important chapter headings. Some of these are "Combinations of Pressure and Velocity Turbines," "Compound Arrangements," "Means for Reducing the Number of Revolutions Per Minute," "The Use of Superheated Steam," "Utilization of the Exhaust," "Internal Resistance," "Governing Appliances," "Reversing Gear," "Clearance Space Packings," etc. Separate chapters are devoted to turbine pumps and blowers, turbines for land vehicles and turbines for use on ship board. The last few pages of the book comprise a list of patent specifications made use of in the preparation of the volume.

The author has not entered into the theory of the machine to any great extent. The book is largely devoted to descriptions of the various forms of turbines which have been developed and includes many different systems. It is not a book on turbine theory or turbine design. It covers a wide range, however, and the reader can obtain a vast amount of information regarding the various systems which have been developed.

The book is open to serious criticism in several respects. Other than the chapter headings, there are no subdivisions to the work, making it somewhat difficult to obtain information regarding any definite machine. The most serious criticism that can be offered is in regard to the illustrations. These are well executed, but, unfortunately, the descriptive lines under each illustration have been omitted.

EXPLORATION

WORK ON THE MESABI RANGE IS EXTENSIVE.

Drills are Busy and New Ore Bodies of Good Size are Being Discovered.

(Special Correspondence.)

Hibbing, Minn., April 30.—Mining exploration and development are at high tide on the Mesabi range. Never since the discovery of its mineral wealth a decade and a half ago has the field been so active in this respect. At the present time no less than 500 diamond drills are engaged in puncturing the earth in quest of ore bodies, or in testing deposits already located. Authority for this statement is the active manager of an exploration company with headquarters at Hibbing, one which, itself, has some forty or fifty drills in commission.

"Practically the entire territory from the Mallman property, near where George St. Clair is exploring, on the east, to a point beyond Bovey and Grand Rapids, on the west, a distance of over 100 miles, is dotted with drill holes, to say nothing of mines," said this expert in an interview at Marquette. "When the extent of this range is taken into account, it is not surprising that it leads all others combined in the matter of ore production, and it can be readily understood that development is only fairly begun. Not even the mining companies operating on the Mesabi know the full extent of the ore bodies contained in their holdings, although the drills have proved the existence of the deposits, and it will be years before many properties are brought to the producing stage."

The Mesabi's History.

The Mesabi really dates as a producer only since 1893, its output of 1892 having consisted of a single cargo of ore which froze in the hatches of the ore pier owing to the late date of its shipment in November. Ever since that time the range has had vast influence upon the iron trade of the United States, if not a most potent influence upon the industrial affairs of the entire globe, for without the Mesabi there could not possibly have been produced the necessary amount of high grade ore needed to supply the demands of the export trade. Enough iron ore could have been mined to meet the demands of the home market, but so much of it—from the fields of Alabama and Tennessee, which supply low-grade bog ores, and from the lower grade Michigan mines—would have been so low in the units of iron that the cost of iron or steel would doubtless have prohibited the export of any but the more highly finished grades. Probably the pipe mills of Birmingham could have sold their product abroad, but it is altogether probable that the home demand would have kept prices at too high a level to allow of any great export business.

It took several years for the furnacemen to become accustomed to Mesabi ores. In the beginning, the founders interested in the district were emphatic in their assertion that Mesabi ore was the best in the world; while iron masters having properties on other ranges would have none of it. However, experience softened the praise of one faction and the criticism of the other. Owing to its fine grain, the average Mesabi ore, when dry, runs freely and packs somewhat like sand. Few of the Mesabi ores can be used exclusively in the furnace stack, and it is customary to mix with them the lumpier ores of the old ranges. Mining by steam shovel, the general practice of the Mesabi mine, is cheap, but not nearly as cheap as extravagant claims put the price in the early days of the range, and, besides, it cheapens the grades of ore produced, since the mines must take their ore as they find it, while at the underground properties on the old ranges several different grades of ore are produced through careful sampling and assaying. Within seven years after its opening the Mesabi had taken the lead of all the ranges, and with the hundreds of millions of tons of ore within its confines the time cannot be foreseen when it will yield its place in the forefront.

Fears Were Ill-Founded.

At the time of the discovery of the Mesabi, the news of its great flat beds containing many millions of tons of ore, to reach which it was necessary only to remove the comparatively shallow overburden of drift, sent congestive chills up and down the spinal columns of mine operators on the Old Ranges. And when it was asserted even that certain of the Mesabi properties were able to produce ore for a shilling a ton at the pit's mouth —the stripping of the surface costs several times this—the Old Range miners, some of them at least, were fairly paralyzed with fright. However, the increase in demand has provided for the Mesabi production, and the Old Range mines are shipping more ore than ever before in their history, incidentally receiving a quarter of a dollar more per ton on both non-Bessemer and Bessemer than are the producers in the territory of their young and more vigorous rival. A peculiar feature of the development of the Mesabi was the creation of a demand for certain grades of Old Range ores that had had no market for a quarter of a century previous.

On both the Marquette and Menominee ranges, and to a lesser extent on the Gogebic, there are apparently inexhaustible quantities of unconcentrated ores, low in phosphorus and high in silica, as a rule, with 35 to 45 per cent of metallic iron. These ores seem especially designed for a complement of the Mesabi, as they supply every defect of the latter. They supply the silica that the Mesabi lack, and by virtue of their minute amount of phosphorus reduce the average to a safely Bessemer mixture, in addition to which, having a slaty cleavage, they break readily and at small cost to the right size for mixture with the fine-grained Mesabi. These silicious ores are known to furnacemen as "sweeteners," and by admixture with Mesabi ores there is produced a fine grade of Bessemer pig. Pig iron is by no means pure metallic iron; the pure metal lacks cohesiveness and is unsuitable for most purposes to which iron is applied. Pig iron requires a certain amount of silica and carbon, as well as traces of other elements, and an ore deficient in silica requires reinforcement.

Old Mines Revived.

The percentage of Old Range ores mixed with the average Mesabi product is not as great now as a few years ago, experience in furnace practice having brought down the proportion, but beginning in 1896 a considerable business was built up in the Marquette and Menominee fields in mining silicious ores from properties that had been idle and considered valueless for many years. It was not long, however, before the big mines of the two ranges took a hand in the business, and they were soon monopolizing that branch of the trade. Old stockpiles, in some cases over-grown with trees of some little size, were assorted and the major portion shipped. Burrows of lean ore held worthless also were forwarded to furnaces, and considerable quantities have been mined underground. To the majority of the big mines still producing this grade, the high silica ore occupies much the same relative position as the by-products of a modern chemical plant, and in some instances the ore so mined and shipped would otherwise necessarily have to be broken and handled as dead rock. Not many mines are now operated to supply high silica ore exclusively, but these have exceptional facilities in the way of large and cheaply mined ore bodies, as, for instance, the Steel Corporation's Moore property, in the Cascade district of the Marquette range.

The Cayuna Range.

Mining men on the Mesabi are watching with considerable interest the results of the exploratory work which has been in progress on the so-called Cayuna range for upwards of a year. The Cayuna lies in the valley of the Mississippi, almost in the center of the Gopher state

and south of west of the head of Lake Superior. At present nearly two score diamond drills are in commission in the field, according to a Hibbing operator, and while only low grade ore has yet been discovered, it cannot well be said that eventually the range will not become a factor of no small importance. To a large extent, however, this will depend on what transportation rates are granted by the Northern Pacific once it is determined that the deposits merit development. The most important discoveries to date have been made in Crow Wing and Aitkin counties. The formation is unlike that of Mesabi, in that the ore bodies do not lie in beds. On the Cayuna, angle drill holes are put down, and the ore is shallow surfaced, being reached at from 60 to 200 feet.

The exact status of the range has not yet been determined. When ore was first discovered, the range was thought by some mining men to be a continuation of the Mesabi, to the northeast upwards of a hundred miles, but this theory is still to be proved. Ore was discovered recently near Little Falls, in Morrison county, south adjoining Crow Wing and still closer to St. Paul and Minneapolis, which has given rise to the belief that Minnesota's development as an iron mining state is yet in its infancy.

The Nashwauk District.

In keeping with conditions elsewhere in the region, the Nashwauk district of the western Mesabi will witness a period of great mining activity this season. The Hawkins, Larue and Crosby properties, among others, will be operated vigorously, employing upwards of 600 men, and more than a million tons of ore will be shipped. The Hawkins, an open pit proposition controlled by the International Harvester Co., will probably be the largest producer in the district, forwarding about 400,000 tons. Two steam shovels will be operated in ore, two more will load from stockpile and a similar number will be engaged in stripping. Considerable new equipment has lately been received. The Larue will ship about 300,000 tons, mining by both the underground and open pit methods. This mine is one of the properties of the recently organized Rhodes Iron Co., of which Lieutenant Governor Maitland of Michigan, is general manager. The Crosby is controlled by the Cleveland-Cliffs Iron Co., and is the only property that corporation will operate this season outside of its bigger and richer mines on the Marquette and Gogebic ranges. It is a new proposition, and will win its ore largely by underground mining. An electric haulage system is being installed, and with other new equipment the mine will be one of the best equipped on the range when ready for full operation.

ON NIAGARA PENINSULA

Canadian Foundry Interests Contemplate Erection of Blast Furnaces.

(Special Correspondence.)

Toronto, Can., April 28.—Frederic Nicholls, president of the Canadian Foundry Co., states that arrangements are in progress looking to the erection of blast furnaces on a large scale at some point in the Niagara peninsula. The leading capitalists interested are closely identified with the Foundry company and the latter will furnish a market for a considerable portion of the output. At present nearly all the iron product of Canadian blast furnaces is consumed in the manufacture of steel rails and other steel products, so that other establishments using large amounts of pig iron are compelled to import it. The contemplated output of the projected furnaces is 200 tons per day for which under the prevailing conditions a market could readily be found. The details of the enterprise are not yet perfected, but in view of the locality selected the inference is drawn that the adoption of the process of electric smelting is being favorably considered by the promoters. The company will be capitalized at $1,000,000.

The rolling mills at Belleville, Ont., which have not been in operation for some years, have been purchased by J. J. Wardrope, of Ottawa, on behalf of a syndicate. Modern machinery will be installed and the mills operated to their full capacity. The city of Belleville has offered $30,000 as a bonus to anyone who will undertake the enterprise.

The March output of the Dominion Iron & Steel Co. was the largest on record for any month. The shortage of cars which has prevailed for some time has been overcome and April shipments will show a large increase. The output of the Nova Scotia Steel & Coal Co.'s open-hearth furnaces for March was 44,000 tons of steel.

The completion of the Canadian Ship Building Co.'s ship yard at Bridgeburg, Ont., is being hastened to enable it to get to work as soon as possible on the 10,000-ton steel freight steamer ordered by the Chicago & St. Lawrence Transportation Co. and the large palace steamer for the Canadian Pacific Railway. These will be the largest boats built in Canada.

The following companies have been incorporated:

Jones Nuderfeed Stoker Co., Ltd., Toronto, $150,000, incorporators, Chas. E. A. Goldman, John M. Millar, Thomas A. Silverthorn, Alex. C. Craig, David A. Brebner, Thos. G. McConkey and Arthur W. Holmsted. Bothwell Locomotive Co., Ltd., Owen Sound, $100,000, provisional directors, James McLauchlan, Frederick W. Harrison, John G. Hay, Stephen J. Parker, Geo. A. Bothwell and Alexander G. MacKay.

PRATT & WHITNEY STATEMENT.

The Pratt & Whitney Co. has filed with the secretary of state of Massachusetts a statement of its financial condition for the year ending Dec. 31, 1905, as follows:

Assets—	1905.	1904.
Real estate	$2,308,847	$2,223,301
Material	1,059,562	1,024,386
Cash, etc.	315,056	182,524
Miscell.	69,061	107,140
Total	$3,752,527	$3,537,353
Liabilities—		
Capital stock	$2,750,000	$2,750,000
Acct's payable	130,871	248,292
Surplus	871,656	525,226
Reserve		13,833
Total	$3,752,527	$3,537,353

Manufacturers Organize.—Before the close of the Chicago Motor Boat Show, the western manufacturers of boat and engines represented with exhibits there, organized the Western Association of Engine and Boat Manufacturers. A. Hunter, of the Hunter-Weckler Boat Co., McHenry, Ill., was elected president; W. C. Anderson, of the Carl Anderson Co., Chicago, first vice president; J. M. Truscott, of the Truscott Boat Mfg. Co., St. Joseph, Mich., second vice president; C. F. Sparks, of the C. F. Sparks Machine Co., Alton, Ill., third vice president; J. Sarvent, Sarvent Marine Engine Co., Chicago, fourth vice president, and A. E. Greene, Western Launch and Engine Wks., Michigan City, Ind., treasurer. Membership in the association is open to all manufacturers of boats and engines in the west on payment of the regular dues.

Iron, steel and manufacturing interests have been among the largest contributors to the relief of stricken San Francisco. Led by the United States Steel Corporation and Andrew Carnegie with gifts of $100,000 each, those in the industry all over the country have made prompt and heavy donations, and by their example have materially increased the contributions of the general public.

Canada is now producing more nickel than all the rest of the world, according to Consul Harvey, at Fort Erie, Can.

CONCRETE RAILWAY TIES.

The investigations which are being conducted to find a substitute for the wooden railroad tie have resulted in a great many forms of steel ties which have been tried with more or less satisfactory results. A form of tie which has been successfully used, but of which comparatively little has been heard is the concrete tie. Several forms of this have been used, but have failed in service, owing to structural defects.

In an article in *The Cement Age* for April, Mr. G. K. Kimball, chief engineer of the Chicago & Alton Railway describes the concrete tie which has been in service on portions of the Pere Marquette Railroad and the Chicago & Alton Railroad for nearly four years, regarding which a single failure has yet to be recorded. These ties are of interest to steel manufacturers, in that steel sections are used in their construction, being in reality the tying member, concrete only being used to support the weight of the trains. Mr. Kimball's article is reproduced in full below.

It is the purpose of this article to consider briefly the present status of the tie question. It is a serious matter, which is rapidly growing in importance, and is receiving more and more attention from year to year. Clearness and convenience seem naturally to indicate its treatment under the three sub-divisions of timber, steel and concrete.

Timber Ties.

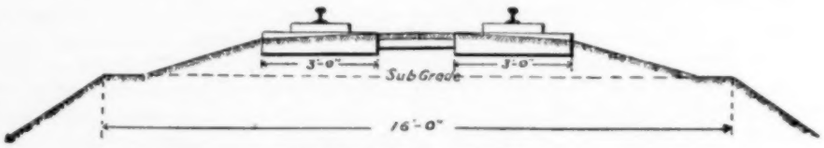
For the present, at least, the importance of this phase of the subject holds first place, and it is well to ascertain what is to be expected in this direction. All concerned recognize that the limited and rapidly receding supply of timber has already caused timber ties, in general, to become poor in quality, small in size and high in price, and if the standards of a few years ago were to be maintained, the price would be practically prohibitive. The grades of timber desirable for this purpose have become far too valuable for other purposes to permit the use of any but inferior materials.

It will be of value in this connection to see what the prospect for relief may be. Aside from the use of steel, of concrete, or some combination of these two materials, the only alternative is in the growth of timber for this purpose, and its use, preserved or otherwise, with tie plates.

Recent information received from the Bureau of Forestry, U. S. Department of Agriculture, may be summed up as follows:

Among the plans proposed, the following are the most promising and important:

1. The purchase and careful management of existing forest tracts.



CROSS SECTION OF ROADBED.

2. The use of inferior timber by means of preservatives and tie plates.

3. The planting of treeless areas.

It is believed that the solution of the problem lies not in any one of these methods, but in a combination of them all.

The Qualities of a Timber Railroad Tie.

A timber to be valuable for tie purposes must possess the following qualities:

1. It must furnish a tie which will give continuous service for from five to eight years, otherwise the expense of renewal will be too great.

2. It must not be too valuable for lumber that it cannot be cut for ties.

3. It must be of rapid growth so that it will reach a suitable size in a short time.

4. It must renew itself easily after cutting so as to maintain the forest without much expense.

Whether these conditions can best be met by planting or the management of existing timber lands will depend upon the region. In many cases it will probably be necessary to start the forest by planting.

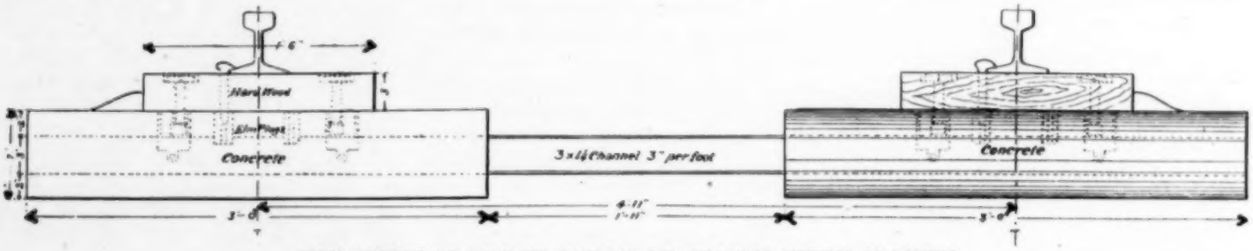
So far no railroad plantations have reached a sufficient size to furnish material for tie purposes, though certain catalpa plantations have yielded a large revenue from the sale of fence posts.

At present it does not appear that it is practicable for a railroad to attempt to raise its entire supply of ties.

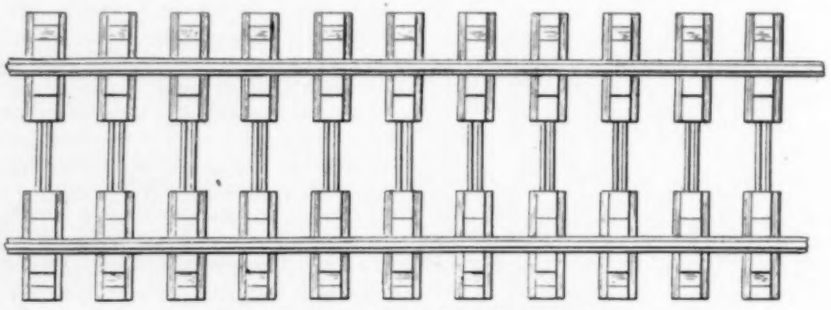
In a well managed forest of the faster growing woods a harvest of ties can be secured in about thirty years, on the poorer soils in about forty years and the yield should be from 300 to 500 per acre, depending on soil conditions, species used, etc.

Some Recent Experiments by Railroads in Forestry.

The most important railroads which have actually gone into this question in earnest and are actually carrying on experiments are the Louisville & Nashville R. R., the Illinois Central R. R., and the Penna. R. R. While in cases the trees planted are not doing especially well, it is mainly due to a lack of sufficient cultural knowledge on the part of those having the plantations in charge.



CROSS SECTION OF CONCRETE RAILROAD TIE, SHOWING METHOD OF LAYING.



PLAN OF ROAD LAID WITH CONCRETE TIES.

The consumption of ties in this country is over 100 million a year, and under present methods about 500,000 acres of

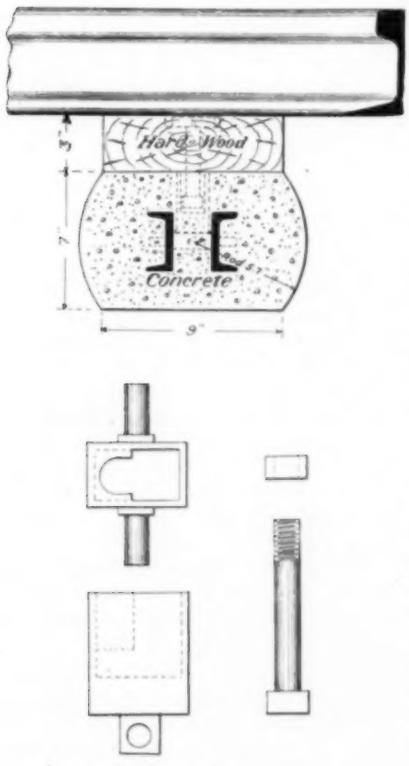
land are being cut over annually to keep up the supply.

The writer has quoted the above in substance from the source already indicated, which is certainly authoritative.

It appears that our main reliance must be upon tree planting; but no results have so far been obtained, and the experiments now under way are lacking in the promise of complete success.

To insure our tie supply from tree planting would require at least (estimating 400 trees per acre after thirty years' growth) the planting of 250,000 acres per year for the next thirty years (7,500,000) before a crop could be harvested. This takes no account of the increase in demand for the next thirty years, neither is allowance made for the visible supply.

Does any one believe that the present supply of timber will take care of the



DETAIL OF FASTENER.

demand and take care of the increase for the next thirty years? Then how long will it take to organize this enterprise and get it started on a successful footing? It is manifest that the tie problem, so far at least as timber ties are a factor, must soon reach a crisis.

The Ultimate Solution of the Railroad Tie Problem.

To the writer it seems that while preservative processes and tree planting are well enough in a way, and serve a good purpose, they are, so far as this question is concerned, but makeshifts after all, and can only put off the day of reckoning, which is inevitable.

The most that can be said of the work so far accomplished by preservative processes, is that the life of ties is prolonged for a brief time at a corresponding increase in cost. The loss and labor incident to tie renewals still remain.

The real demand of the day with reference to "permanent way," so called, is that track construction can be made really "permanent" in some reasonable definition of that term. For this purpose steel ties have been used.

The Comparative Merits of Steel Ties.

By steel ties I mean only those not combined with concrete. The only form of steel ties that merits attention is that now under experiment by the New York Central and Hudson River Railroad, the Pennsylvania Railroad and the Lake Shore & Michigan Southern Railroad. These ties were put in late in the season of 1904, and consist of a section of I beam rolled for the purpose and of the following dimensions:

Length	8 ft. 6 in.
Depth	5½ in.
Top flange	4½ in.
Bottom flange	8 in.
Weight per foot	19.7 lbs.
Cost in small lots	$2.25

This tie is the outgrowth of the Burer "rail" tie, so called, where a piece of old rail is used inverted with a plate secured to the head, thus forming the bearing surface in the ballast, the track rails being secured to the base of the piece of old rail forming the tie.

Possibly it is too soon to make definite conclusions concerning the use of this I beam, but some things are clear. Much difficulty has been experienced in securely fastening the rails to these ties, and suitable fastenings have yet to be devised. As now arranged they consist of bolts passing through the top flange of the I beam used as a tie, and holds clips formed to fit the base of the rail. A wooden shim is sometimes used on top of this tie. The passage of a single train has been known to throw the track seriously out of gauge, and reference is not made to an isolated case.

The insulation, where these ties have been used in bonded track, has proven somewhat unreliable. Rail anchors have been found necessary to keep the track running, and a decided tendency has been developed to roll the ties in the road-bed, thus disturbing the tamping and further straining the fastenings. Not much seems to have been done to preserve these ties from the drip of brine from refrigerator cars and the action of the elements. It still remains to be shown what the effect of derailment will be. Unless the same support is furnished as by timber ties, which is hardly to be expected, the result is sure to be more disastrous to train as well as track.

Steel and Concrete-Steel Railroad Ties.

Under the head of concrete ties, a careful distinction should be made between steel-concrete ties and concrete-steel ties, the difference being determined by the predominance of one or the other of these two materials. This difference is vital. An illustration is found in the Burer rail tie before referred to. At one stage of the experiment Mr. Burer removed the plate from his tie and encased the rail in concrete. The section of the concrete was relatively small, the bearing coming directly on the steel and the vibration of the structure was determined by the steel, with the results that the concrete was at length shattered.

In most all the attempts to make so-called concrete ties it has been assumed to be necessary to make them of full length. As a natural consequence they have first broken in too near the center because of transverse stress at that point.

The fact is that in all of our track construction the pressure on the ties is eccentric with reference to the base of the tie; that is the center of pressure and the center of figure do not coincide. For this reason, and without exception, the ends of the ties in all of our track are more or less loose in the ballast, in a position above and free from the bed except when under load. Doubtless ties of full length can be made to carry the load and distribute the pressure, but it is needless, and the cost would be prohibitive.

Previous Attempts to Make Ties of Concrete.

There have been many fitful attempts to make a satisfactory concrete tie, but on all the information I have been able to obtain, with the exception to be referred to, efforts have been confined to full length ties and have all failed.

For this reason the idea prevails more or less that concrete is not a suitable material for this purpose, whereas failure is inevitable with long ties except at a prohibitive cost. The idea that concrete will not stand the shock of impact under heavy and high speed trains is erroneous, for blocks of concrete, even without steel, when properly designed and arranged are capable of supporting the heaviest traffic.

The French roads in Indo-China have been using concrete for some years and to a large extent.

The writer's attempt to solve the problem began some years ago and the subject has been pursued as closely as possible ever since. The design adopted

and here described was completed and first put in track in November, 1901.

The First Successful Concrete Tie and Method of Using.

It consists of two blocks of concrete each three feet long, placed symmetrically under each rail so that the center of pressure and the center of figure of each section of the tie will coincide. These two blocks of concrete make one tie and are rigidly connected by being molded on the ends of a pair of three-inch channels weighing three pounds per foot. The channels are back to back and space two inches apart in the clear.

The concrete blocks are seven inches thick and nine inches face, and the cross-section is the same as that of a timber tie hewn or slabbed from a log about 11 inches in diameter. It presents the appearance in the track of an ordinary tie with a piece two feet feet eleven inches long cut out of the center.

CONCRETE TIES PLACED IN NOVEMBER, 1901.

Hard wood blocks three inches thick, nine inches wide and eighteen inches long, designed to cushion shocks, distribute pressure, support derailed trucks and serve as spiking blocks, are secured to the top of the concrete blocks. Each hard wood block is, of course, centered transversely to the line of the rail. Cast iron sockets that also serve to space and connect the channels are molded in place in the concrete, and serve as an anchorage for holding down the hard wood blocks. These sockets receive suitable bolts, head down, so that when they are slipped to place and the holes through which they are introduced have been plugged they cannot be withdrawn.

The first ties put in have been in service over four years and small lots have been put in from time to time since. The last were put in the track of a Chicago & Alton Railroad in October, 1905. Of all the ties put in from first to last none have failed.

The Practical Results that Have Been Attained.

Three and one-half years ago seventeen hundred of these ties were put in the track of the Pere Marquette railroad in Bay City, Mich. The ties were put down on a concrete bed and each tie was set to the grade, being imbedded in a joint of cement mortar. The rails were then spiked down and the track filled in. I am informed by those in charge that there has been no change in the line, gauge or surface of the track.

The fact that concrete will stand in this form and under these conditions cannot be questioned. Good ordinary concrete is all that is required. All ties made up to date have been of concrete mixed in the following proportions:

Broken Stone Concrete.

Cement	6 parts.
Broken stone	11 parts.
Sand or fine gravel	3 parts.
Total	20 parts

The broken stone passed through a 1½ inch screen and was clean and free from dust.

Gravel Concrete.

Cement	6 parts.
Medium gravel	14 parts.
Total	20 parts.

None of the pebbles to be larger than 1½ inches in diameter. Atlas cement was used principally.

The estimated cost and weight of these ties is as follows:

Iron and Steel:	
52 pounds at 1⅛c	$0.58
Concrete, 3 Cubic Feet:	
374 pounds at $4.50 per yd	$0.50
Wood Blocks, 7 Square Feet:	
10 pounds at $17.00 per M	$0.10
Total:	
436 pounds.	$1.18

It is not too much to claim that this affords a solution for the tie problem at a moderate cost, and offers large economies in wear of rail, ballast and in track labor.

GERMAN INDUSTRIES.

The British consul general at Berlin, in his annual report of the trade of Germany in 1905, recently made public, discloses the fact that in the last decade German exports have increased 68.3 per cent against 45.9 per cent increase as recorded by Great Britain. A corresponding gain in the number of employes in Germany is noted over the figures of 1895, when the *Occupation Census* placed the number engaged in the various industries and mining at 8,281,220. From that date until 1904 increases in various lines were as follows: Mining industries, 430,155 to 653,230; smelting works, 47,401 to 63,636; iron foundries, 67,903 to 104,604; welded iron works, 38,190 to 24,334; ingot iron works 75,080 to 140,966.

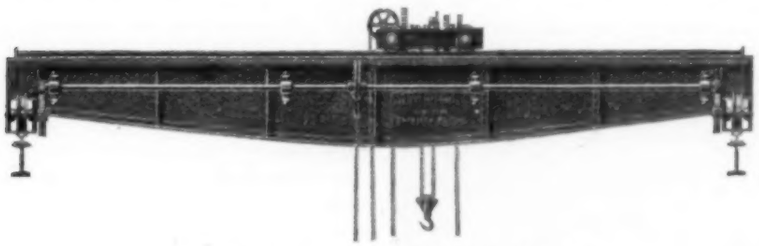
Referring to the iron and steel trades, the Consul remarks that the German output of pig iron and manufactures of iron and steel doubled from 1895 to 1905, while the number of hands increased by not quite 50 per cent. The manufacture of pig iron has been improved through the automatic feeding of blast furnaces by means of electrical hoists and the introduction of special casting molds for pig iron not utilized immediately in the molten state, while in iron foundries and engineering works manual labor is economized by the application of the latest patent electric transport and hauling devices. The cost of production is being further reduced by the utilization of blast furnace gases for driving blowing machines and gas engines, and through the introduction of uninterrupted working. Returns issued by the German steel works syndicate show that the trade in partly finished goods was on the whole much better than in 1904.

In the ship building industry great activity prevailed in 1905. Exclusive of warships and craft under 100 tons, the number of vessels on the stocks in German yards at the end of September amounted to 72, aggregating 224,642 registered tons. About 90 firms are engaged in ship building in Germany, employing together about 65,000 men.

Belgian Technical Schools.—From the February issue of the *Revue du Travail* it appears that on December 31 of last year there were 620 technical schools in Belgium, an increase of 18 over the preceding year. Of these schools 352 were for girls only, and 268 mixed schools. A very large number of the girls' schools were ecoles menageres or housekeeping schools. Among the special types of schools there were 25 for stone dressing and stone carving, 33 weaving schools, and two apprenticeship schools. The total teaching staff was 3,372 and 17,359 girls and 37,743 boys were under instruction.

THE FREVERT HAND POWER TRAVELING CRANE.

To handle the work in many shops which is too small to justify the installation of large power cranes, it is advantageous very often to use hand cranes. To supply this want, the Frevert Machinery Co., New York city, is placing upon the market a hand power traveling crane which is illustrated in the accompanying cut. The



FREVERT HAND POWER TRAVELING CRANE.

crane is of the best steel construction throughout, the bridge being composed of I-beams or of built-up steel plate girders to suit the conditions of span and load. Steel girders of box section strongly reinforced at the ends for axle bearings and rigidly connected to the bridge frame by body bound bolts constitute the trucks. These are supplied with double-flanged truck wheels of chilled iron with ground treads. The wheels are keyed to extra long axles fitted with steel roller bearings and the wheel base is sufficiently large to give stability to the crane. The gearing for the traveling movements of the bridge comprises a squaring shaft with cut pinions on the ends, which engage cut gears on the truck wheels. The alignment of the crane, upon which depends the uniform traveling of the machine and its ease of operation, is insured by a special design of adjustable bridge shaft bearing bracket, which is used for supporting the driving shaft. The parts throughout are standard and, as a result, easy to duplicate.

The trolley frame also is built up of steel shapes, is fitted with double flanged chilled wheels and is supplied with roller bushed bearings and heavy steel axles. The hoist is built in the trolley, has large wearing surfaces, and is of the spur geared type. The load, at any point of the lift, may be sustained by an automatic friction brake, and a slight pull on the hand chain in the opposite direction permits the load to be lowered steadily and easily. Provision has been made to lower the load rapidly by fitting the crane with a brake release. This release is operated from the floor by a chain with lever attachment, which controls the brake. The gears used throughout are milled from solid steel blanks. Roller bearings have been used wherever possible, and the freedom with which the hook swivels is obtained by using a bronze bushed bearing.

PRODUCTION OF IRON AND STEEL IN FRANCE.

The following figures taken from the *Journal Officiel* show the production of iron and steel in France in 1905. Comparisons of 1904 with 1905 are not possible throughout owing to the form in which the table is presented.

	1904.	1905.
Cast iron—	**Tons**	**Metric tons**
Forge pig	—	686,000
Foundry pig	—	670,000
Bessemer pig	—	157,000
Thomas pig	—	1,531,000
Special pig	—	33,000
Total	2,999 787	3,077,000
Wrought iron and steel—		
Merchants' iron and steel	—	635,000
Sheets	—	77,000
Total	—	712,000
Mild steel—		
Rails	246,339	283,000
Merchant steel, including tires of wheels	—	635,000
Sheets	299,376	274,000
Forgings	—	37,000
Steel castings	—	26,000
Total of mild steel	—	1,255,000
Ingots	2,080,354	2,110,000
Blooms and billets	—	955,000

The production of pig iron, wrought iron, and steel not being compiled in the same way as the output of previous years, an exact comparison is not possible. The main difficulty arises out of the differences in the method of classifying the output of finished iron and steel, which for 1905 are grouped as one total under the heading "Merchant Iron and Steel," and also under the headings "Mild Steel," "Ingots," and "Blooms and Billets." The production of wrought iron, as such, is not likely to have increased in 1905, but the figures, as presented, do not enable us to state this as a definite fact. Assuming the output of finished iron to be the same as that of 1904, namely, 554,632 tons—the quantities of steel produced would work out as above for 1905.

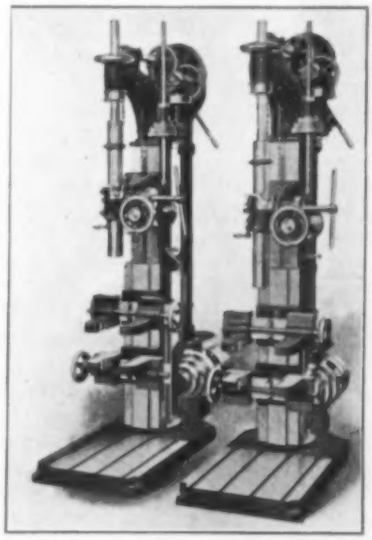
	Tons.
Ingots	2,110,000
Mild steel	1,255,000
Other steel	157,368

HAMILTON UPRIGHT DRILLS WITH CYLINDER BORING ATTACHMENT.

The accompanying illustration shows the new drill being placed on the market by the Hamilton Machine Tool Co., Hamilton, O., in two sizes, 28-inch and 32-inch swing. This tool differs from the standard upright drill of the same size, in that it has longer spindle traverse and special fixtures for boring pump cylinders and similar jobs. The tools can be supplied individually or in gangs of two or more, depending upon the nature and amount of work to be done.

As in the ordinary upright drills of this concern, the new tool has sliding head, back gears, upright feed, automatic stop and the other features ordinarily to be mentioned. Instead of the usual table arm a pair of self-centering two jawed chucks are substituted, these being vertically adjustable to each other and to the spindle. If desired, to insure the greatest accuracy in boring a hole, a pilot may be rigged on the end of the boring bar by drilling a hole in the base.

This drill is particularly advantageous in the operation of boring pump cylinders, and in doing other work where an unusually long spindle traverse is necessary. An economical advantage is also obtained from the fact that one operator can attend to two or more machines, as an automatic control of the feed is provided. For the necessary additional cost, the tool will be provided with a friction-geared tapping attachment for work where holes are to be tapped.



NEW HAMILTON UPRIGHT DRILLS.

The company has issued a bulletin fully describing these tools and giving dimensions of all parts.

FREDERICK REMSEN HUTTON.

Frederick Remsen Hutton, who has just resigned as secretary of the American Society of Mechanical Engineers after a period of service of nearly twenty-five years, was born on May 28, 1853. He is of Dutch descent upon the father's side, and English upon the mother's. His ancestors are among the Brinkerhoffs, Remsens and Van Wycks of the Hudson River valley. His father was Mancius Smeeds Hutton.

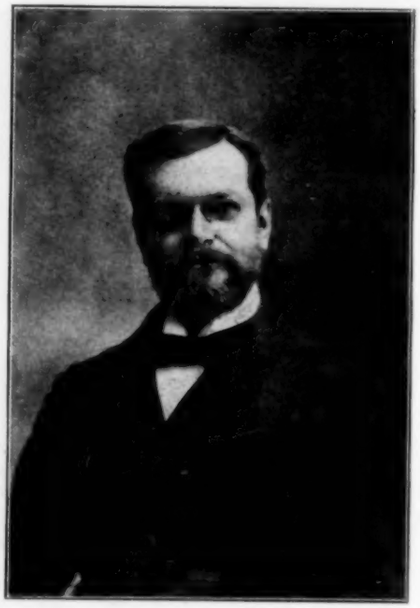
Prof. Hutton graduated from Columbia college in 1873. He immediately entered the school of mines of that college, receiving the degree of civil and mining engineer in 1876. Columbia gave him the honorary degree of Ph. D. in 1881 in recognition of his achievements in connection with the preparation of elaborate monographs upon machine tools and pumping engines for the tenth census of the United States. On the one hundred and fiftieth anniversary of Columbia university in 1904, it gave him the further honorary degree of Sc. D.

A re-organization was made of the engineering department of the school of mines of Columbia university in 1887 and Prof. Hutton became instructor in mechanical engineering. In 1882, he was made adjunct professor and in 1891 he became full professor. From 1899 to 1905, he served as dean of the engineering faculty.

Prof. Hutton became connected with the American Society of Mechanical Engineers at its organization in 1880. The society methods were overhauled in 1883, and in the face of the difficult problems of that period the council elected him secretary of the society, and he began his work with an assistant whom he paid out of his own modest salary. The work was done in a small office whose rental was also paid by Prof. Hutton. He has served this society as secretary continuously from that date to the present.

Prof. Hutton is the author of two of the elaborate monographs prepared for the tenth census in 1880. One covers the department of machine tools and wood working machinery and the other the subject of pumps and pumping engines. These are a full report of the state of the art at that date. His text-book entitled "The Mechanical Engineering of Power Plants" was published in 1897 and the text-book "Heat and Heat Engines" in 1899. These were followed by a treatise on the "Gas Engine" in 1904. Prof. Hutton has also served as departmental editor on *The Engineering Magazine*, as associate editor on Johnson's Universal Encyclopedia and as special expert in the revision of the Century Dictionary, giving definitions on engineering which are shortly to appear. He has been a frequent contributor to the transactions of the American Society of Mechanical Engineers and to technical literature, ad magazines and journals.

Probably, the most impressive achievement in Prof. Hutton's life came with the transfer of Columbia university from its limited sight on 49th street, near the New York Central railroad, to its present magnificent location on Morningside Heights. This development gave chance to provide for the university a group of mechanical laboratories which should be worthy of the scale on which the university was starting at its new site. These laboratories are one of the "show" features of the university, and are doing



FREDERICK R. HUTTON.

splendid work in the education of young engineers.

Prof. Hutton is identified with many other bodies, philanthropic, educational and social in the city of New York in which he lives.

Fierce American Competition.—In the opinion of the *London Commercial Intelligence* the tin plate industry in South Wales is remarkably weak. In this connection it says: "The tin plate trade seems to be going from bad to worse. American competition is being severely felt, and though some of the Welsh makers are quoting under cost price to secure Canadian orders, they are being undersold to the extent of about 6d per box, with the result that American deliveries into Canada are going up by leaps and bounds. In other markets, too, the Americans are entering into fierce competition with the Welsh makers, it being reported that the quantity of tin plates on which the United States government allowed drawback during the last fiscal year was 151,677,870 pounds, an aggregate which has been beaten only twice before."

THE RESISTANCE OF IRON AND STEEL TO REVERSALS OF DIRECT STRESS.[1]

BY T. E. STANTON, D. SC., AND L. BAIRSTOW.

While recognizing the valuable work which has been done by previous observers in the study of the fatigue of metals the authors call attention to the fact that further experimental work on the subject is much needed for the following reasons:

1. Practically all the previous work, with the exception of Reynolds and Smith's experiments, has been done by subjecting the materials to transverse stresses, the intensity of which has, therefore, to be calculated by the ordinary theory of bending.

2. The resistance of the materials in common use by engineers at the present day when subject to reversals of stress is imperfectly known, and there exists considerable difference of opinion as to the materials best suited for stresses of this kind.

3. Although it appears from Reynolds' and Smith's experiments that the resistance of iron and steel is seriously diminished when the alternations are very rapid (i. e., 1,500 to 2,000 per minute), it is not known if this reduction in resistance is considerable at those speeds which are common in high-speed reciprocating motors (i. e., in the neighborhood of 800 reversals per minute), since the majority of experiments have been made at approximately 60 reversals per minute.

4. Although it is generally recognized that the effect of moderately rapid or suden changes in section of materials subject to reversals of stress is to diminish their resistance, the amount of this reduction in strength for the various materials commonly used is not known.

5. The common assumption that, in cases in which the stress varies from tension to compression, but between unequal limits, the resistance depends solely on the range of stress and not on the actual values of these limits, has not been experimentally verified.

From these considerations it was decided to undertake a research, the object of which should be the experimental determination of the resistance of certain kinds of iron and steel, under the special conditions mentioned in the above paragraphs, when subject to reversals of direct stress.

The experiments were made on the alternating stress testing machine, which has been designed and constructed at the National Physical Laboratory, and which has been fully described in the technical press.

Jointly with this work, a microscop-

[1] An abstract of a paper read before the Institute of Civil Engineers of Gt. Britain, April 10, 1906.

ical investigation has been made of the changes which take place in the crystalline structure of materials under reversals of stress as the test proceeds, to determine, if possible, the manner in which ultimate failure occurs.

The materials upon which the tests have been made may be conveniently divided into three groups:

1. Three samples of Swedish Bessemer steel and one sample of Swedish charcoal iron presented by Mr. R. A. Hadfield for the purpose. The carbon content of the steels was approximately 0.17, 0.44, and 0.64 per cent.

2. Four samples of steel presented by Messrs. Belliss & Morcom for the purpose. Of these, two were mild steel bars, one was a bar of harder steel used for piston rods, and the fourth consisted of specimens which had been cut from a large steel forging.

3. Two samples of wrought iron of British manufacture, bought for the purpose of the tests.

Although more uniformity in the results of the tests would no doubt have been obtained by subjecting all the specimens cut from any given material to an annealing process, it was felt that this would detract from the value of the tests owing to the well-known effect of heat treatment on the resistance of steel. For this reason the tests were made on the bars as received; and in cases in which there were several bars of the same material, the specimens in any group of tests were not always cut from the same bar. This does not apply to the case of the specimens whose structure was examined microscopically, in which the actual resistance was of secondary importance.

The results of the experiments may be stated briefly as follows:

1. The superiority, in resistance to reversals of stress, of moderately high-carbon steels over low-carbon steels and wrought irons, which was discovered by Wöhler to exist when the rate of reversals was 60 per minute, still holds when this rate is increased to 800 per minute, although according to Reynolds' and Smith's experiments this superiority no longer exists when the rate of reversals is in the neighborhood of 2,000 per minute.

2. As far as comparisons can be made between the results of the present experiments and those of Wohler and Sir Benjamin Baker, there is no marked reduction in resistance due to raising the rate of reversals to 800 per minute.

3. Experiments in which the ratio of tension to compression varied from 1.4 to 0.72 indicated that between these limits the value of the maximum range of stress was practically independent of the actual values of the limiting stresses in tension and compression.

4. The resistance of the materials in three typical cases of rapid reduction of area of the specimens has been determined.

5. The failure of iron specimens due to the development of the slip-lines of Ewing and Rosenhain into cracks has been determined for the case of direct stress; and the failure of moderately high-carbon steel, due to the development of cracks in the ferritic areas of the structure, has also been established.

ESTABLISHES BRANCH.

Canada Iron & Foundry Co. will Locate at Fort William, Ont.

(Special Correspondence.)

Toronto, Can., April 30.—The Canadian Iron & Foundry Co., of Montreal, proposes to establish a branch plant at Fort William, Ont., provided it can secure free a site with 1,000 feet frontage just above the Canadian Northern Railway Co.'s coal docks. Conferences between representatives of the company and the town have resulted in an agreement being arrived at under which a by-law will be submitted to the citizens giving the company the proposed site on its guaranteeing to install a $125,000 plant and employ 300 men. The company is also to deposit in the bank $20,000 as a guarantee of good faith.

The wire fencing industry is very active this season. The McGregor Banwell Fence Co., of Walkerville has secured a contract with the Canadian Pacific railway for its supply of maintenance fencing for the year. The Canadian Steel & Wire Co., of Hamilton, Ont., which since starting on a small scale four years ago has steadily increased its plant has, this season put on the market a new line, the high carbon woven of No. 9 gauge heavy wire which is much in demand.

The shareholders of the Canadian Westinghouse Co., Ltd., at a meeting held in Hamilton on April 23 passed a resolution approving of the increase of the capital stock from $2,500,000 to $5,000,000.

Hon. Mr. Matheson, provincial treasurer, made the announcement in the Ontario legislature last week that the government guarantee of $2,000,000 of the bonds of the Lake Superior Corporation expires on Tuesday. Provision would have to be made to renew all or a portion. A bill providing for the renewal has been put through. The securities held by the government will be released, in proportion as the amount is paid up. The steel works at Sault Ste. Marie have received an order from James J. Hill, of the Great Northern railway, for 20,000 tons of steel rails for roads to be constructed in the Canadian northwest.

The Hamilton Rolling Mills are being supplied with natural gas. The Ontario Pipe Line Co. having put in a six-inch feed pipe in each of the furnaces, eight one-inch pipes feed the burners and there are eight other auxiliary pipes of one inch each.

The steel frame-work of the fat stock building at the Canada Central Fair grounds, Ottawa, which was being erected by the Locomotive & Machine Co., of Montreal, suddenly collapsed April 23. About six "bent" trusses had been placed in position on columns when one of the trusses gave way, carrying the others down and bending over the columns. Five men were severely injured. The accident is supposed to be due to lack of proper bracing.

Office Changes.—The Tennessee Coal & Iron Co. has moved out of its offices in the Hanover Bank building, No. 5 Nassau street, New York. The operating offices are to be located in Birmingham, Alabama, and the directors and the sales department will occupy quarters in the offices of the Republic Iron & Steel Co., in the Trinity building, No. 111 Broadway. Secretary and treasurer Hoover left for the south on April 27 and transferred with him the accounting and treasurer's departments of the company. Vice President Beecher will a few days later move the executive offices to rooms in the offices of the Republic Iron & Steel Co. The sales departments of the two companies have been consolidated or at least brought into such harmony that some of the important officials can act for both corporations. E. B. Blandy, eastern manager of the Tennessee Coal & Iron Co., and for several years New York manager for Matthew Addy & Co., has been appointed eastern manager of the sales departments of both companies and has already assumed charge of the combined offices at No. 111 Broadway.

TRADE TIPS FROM THE CONSULS.

Excellent openings for American machinery are reported in Bohemia. Jenny & Schindler, of Bregenz-Rieden, are to construct an $800,000 electrical works at Audelsbuch, and a number of other extensive plants are to be built.

Iron exists in considerable quantities in Peru, but has been left untouched because of lack of fuel for smelting.

The Season's Start on the Ore Ranges.

(Special Correspondence.)

Ironwood, Mich., April 28.—The ore shipping season is under way, and it promises well. There is every prospect that the year will be the most prosperous the Lake Superior region has ever known. Barring unforeseen contingencies, more ore will be sent to the lower lakes than in any past season. The iron trade continues decidedly healthy, so much so that ore sales up to capacity have been the rule, and the mines in general are well prepared to meet the demands upon them. Since the close of navigation last year there have been accumulated large stockpiles, into which steam shovels are already digging; the producing properties, both underground and open-cut propositions, are well opened ahead, and mining facilities and equipment everywhere have undergone improvement and enlargement. New shipping docks are building, old piers have been improved, and with trackage extensions and rolling stock additions the railroads are ready to handle the great volume of traffic in store for them. There are no labor troubles in sight in the mining fields, and if all goes well on the lakes and at the receiving ports there is no apparent reason why last year's movement of approximately 34,350,000 tons should not be materially exceeded.

In the mining country, the popular estimate of this season's shipment of ore is 38,000,000 tons, and it is considered that the bulk of the increase of 3,650,000 tons will come from the Mesaba range. Vexatious delays in the receipt of timber for the new dock of the Steel Corporation's Duluth, Missabe & Northern road at West Duluth will postpone the completion of that huge structure—the biggest pier of its kind on the globe—until August, probably, yet it would not cause much surprise were this one system to handle 10,000,000 tons before the Great Lakes have again become ice-bound. Nor would it occasion wonder were an amount in excess of 8,500,000 tons shipped from the Two Harbors piers of the Duluth & Iron Range, also a Steel Corporation property; neither would it amaze if the Great Northern, too, excelled all past records by forwarding upwards of 6,500,000 tons from its ore dock system on Allouez bay. This would make, for the Mesabi and Vermillion ranges, a total shipment of 25,000,000 tons, approximately, or an increase of 3,170,000 tons in round numbers compared with last year, when, combined, the sixty-five producing mines on the Mesabi and the six shippers on the Vermillion forwarded 21,830,000 tons to market. Shipping from Escanaba, Marquette and Ashland, the seventy-five active mines on the Menominee, Marquette and Gogebic ranges last year sent out altogether 12,311,000 tons. They stand ready to better that record this season, and if only to the extent of 460,000 tons, apportioning an aggregate movement of 25,000,000 tons for the head of Lake Superior, it would give for the entire region the movement of 38,000,000 tons popularly estimated.

The Mountain Iron.

Undoubtedly the biggest individual shipper in the region this season will be the Mountain Iron, the Mesabi giant, which last year shattered all world's records by forwarding 2,495,000 tons, an amount greater than half of the entire Menominee range production of 4,495,500 tons, shared in by thirty mines. The Mountain Iron is expected to send out fully as much this season, if not more. The Republic Iron & Steel Co., which last season shipped 352,000 tons from its Mesabi range properties, will this year increase the output to half a million tons. This ore will come from the Kinney, Bessemer and Victoria mines, the last of which was idle last year. The Franklin and Wills, which last season were active to some extent, will not be operated this year. From its Cambria and Lillie mines, on the Marquette range, the company will ship about 100,000 tons this season.

The Virginia District.

In the Virginia district of the Mesabi both shafts of the Jones & Laughlin Co.'s Lincoln mine are in commission, and ore is also going forward from the stockpile. Shipments are also in progress from the Commodore and Higgins mines, in the same vicinity. There is much activity at the Steel Corporation's Ohio property, which it is intended to strip this year, preparatory to which a steam shovel has been in operation, digging a ditch by means of which the swamp on the tract is to be drained. The Brunt mine, an underground proposition of the newly organized Rhodes Iron Co., and the Wacootah, an open-cut property, controlled by the Pitt Iron Mining Co., are new producers a few miles west of Virginia which are to be added to the shipping list this spring. Their ore will be handled by the Great Northern, which to serve the properties is building a spur track from its main line.

The Shenango mine, which is shipping from the Chisholm district, has the largest stockpile in that field, it amounting to about 125,000 tons. The two shafts are being connected by drifts, and in other respects the property is being prepared for an enlarged production. A new shipper at Aurora, where the Miller is opening its second season, is the Mohawk, and it is expected that before the summer is over, there will have been added to the list the Meadow. This property is being developed by Geo. A. St. Clair of Duluth. A shaft is sinking and drifting to the ore body will soon be in progress. On Section 8, 58-16, east of Biwabik, a diamond drill is engaged in exploratory work under contract for D. T. Adams of Duluth, and associates.

River Course Diverted.

The Dober mine, a Steel Corporation property in the Iron River district of the Menominee range, is being operated almost to capacity. Diamond drill work has shown up considerable ore, and the underground appearance of the mine is considered the best in its history. Much of the ore here lies under the bed of Iron River, and for safety in operation the course of the stream was diverted a few years ago by the construction of a new channel for a distance of half a mile at a cost of $50,000. A similar procedure was taken at the Riverton property, a mile north, which also is owned by the Steel Corporation.

The largest mine in the Iron River field, and one that promises to vie with the giant Chapin for Menominee range honors, is Pickands, Mather & Co.'s Caspian, a property of 160 acres now in process of development. Some ore will be shipped this season, while the property is being equipped in a manner in keeping with its worth. The pumping facilities are being reinforced, additional machinery having been purchased.

The Baltic mine, in the same field as the Caspian, and also controlled by Pickands, Mather & Co., will this season ship the greater portion of the ore produced in the Stambaugh valley, which altogether will amount to about half a million tons. The Baltic is in fine physical condition, and with recent improvements is well equipped for large production. Pickands, Mather & Co. are also at work on the Fogarty property, in the same section, town and range as the Caspian, and in all probability will open a mine there. Test-pitting is in progress for the purpose of locating the apex of an ore body tapped from the exploratory shaft by diamond drilling. The ore was encountered at a point 600 feet distant from the present shaft, and to develop the deposit a second shaft will be necessary. Test-piting also is under way at the West Hiawatha property, and some promising

ground has been met with. The formation here is bunchy, however, as is the case at the Hiawatha mine, recently unwatered by the Buffalo & Susquehanna interests preliminary to examination with reference to its probable purchase. The West Hiawatha is under option to the same company, as is the Tully exploration, in Section 36, 43-35, where operations are being conducted to prove up an ore find made some time ago. The Youngs property, in 42-35, is opening up well, with some prospect that it will be taken over by the Buffalo & Susquehanna people.

Exploration Work Proceeds.

Oglebay, Norton & Co., of Cleveland, is another concern which is active in an exploratory way in the Stambaugh valley. It is sinking and drifting on the Selden "forty," west of the Stambaugh depot in a manner which indicates that encouragement has been met with, and similar operations are in progress at the Waldron property, in 36, 43-35. The Selden tract lies on both sides of Iron river, and should a mine be opened it is likely that the water would offer the same problem as arose at the Riverton and Dober.

A mining feat of no little importance is that undertaken at the Baker property, in 31, 43-34, where Corrigan, McKinney & Co., of Cleveland, are engaged in sinking a shaft through a heavy overburden to reach an ore body previously located by diamond drilling. Progress has been very slow. The drop method was first utilized, but because of the nature of the ground penetrated it has been necessary to resort to lath driving. Both the Steel Corporation and the Cambria Steel people previously held the Baker under option, but, although their drills encountered ore, the problem of sinking was such that apparently they did not relish the idea of undertaking the task. However, Corrigan, McKinney & Co. have a faculty of opening mines at properties given a black eye by other concerns, as has been demonstrated in the Crystal Falls district, and no one doubts that their efforts at the Baker will be entirely successful. This concern's Great Western mine was the first Crystal Falls property to begin shipping this season, principally for the reason that its basic ore stocking ground could hold no more, and it was closely followed by Oglebay, Norton & Co.'s Bristol mine.

A Mine with a History.

During the progress of the development work at the Saginaw mine, in the Norway district of Dickinson county, Menominee range, a stockpile of 10,000 tons of merchantable ore has been accumulated and will be shipped as soon as railroad facilities are available. The history of this property, formerly the old Perkins, is interesting. It lies just west of the Briar Hill mine of the Cambria Steel Co., and was a big and profitable producer during the first decade of Menominee range mining. It was opened in 1879 and closed in 1890, although five years later a cargo of ore was picked up and shipped from the old dumps. The limestone at the foot and the jasper at the hanging came altogether at a depth of about 400 feet, and apparently cut out the ore entirely. Exploratory work was unsuccessful in locating new deposits, and the mine was abandoned as a scram. There were few who considered it likely that the mine would ever be restored to the active list, but Captain John Perkins of Norway, was not of their number. He had confidence that the property still possessed worth, and when last year, following a few months' exploratory work, a body of fine blue ore was opened up, not much difficulty was had in inducing capital to take up the proposition anew. The mine was taken over by John T. Jones of Iron Mountain, an associate of the late Peter Kimberley of Chicago; the Saginaw Mining Co. was organized to develop the deposit, and the results since then have been entirely satisfactory, much ore having been located by drifting and drilling. Shaft sinking is in progress, and since a more powerful hoisting plant has been installed, better headway will be made. A diamond drill hole is being put down at an angle of 45 degrees at a point some distance from the present workings, and is expected to encounter the ore formation at a depth of 800 feet.

The Millie mine, at Iron Mountain, operated by the S. Dessau Co., has resumed shipments after an idleness of two years, and is expected to make the biggest production in its history, which will be upwards of 100,000 tons. The ore is easily won, being mined from the hill at the east end of Fleshiem street, and at the present rate of production there is said to be enough of it to keep the property in commission for a score or more years to come. A force of 100 men will be employed throughout the season. The first shipments have been made to the Algoma steel plant at the Canadian Soo. Negotiations are in progress whereby it is probable that interests identified with the Wisconsin & Michigan railway will take over the Cuff exploration, a tract of 160 acres in Section 32, near Norway. Test pits have disclosed a twenty-seven-foot vein, ore from which assays 57 per cent in metallic iron. The work of harnessing the water power at Sturgeon falls, Menominee river, for the use of the Cambria Steel Co.'s mines at Norway, has been making satisfactory progress ever since started last fall. Much remains to be done, however, before the machinery is installed, and it will be a number of months before it will be possible to transmit the resultant power to the Penn group of mines. About 150 men are still employed, the majority of them in rock blasting and excavation.

New Company's Operations.

The recently organized Rhodes Mining Co., of which Lieut. Governor A. Maitland of Michigan, is the general manager, and whose field of operations is at present limited to the Mesabi range, evidently intends to branch out in the Lake Superior region. It has, at least, secured options on a number of promising mineral tracts near Iron Mountain, business in this connection occasioning the presence on the Menominee range for a few days of John C. Eden of Chicago, president of the company, and his mining engineers. Articles have been filed in the office of the secretary of state at Madison, incorporating the Florence Iron Co. of Wisconsin. The new company succeeds the Florence Iron River Co., and acquires the latter corporation's holdings in the Badger commonwealth, chief of which is the Florence mine, Menominee range. The controlling interest in the Florence company is Lauterbach, Thalman & Co., of New York.

The concentrating works of the Pewabic Mining Co. at Keel Ridge, Iron Mountain, have resumed operations after an idleness of several years. Methods have been evolved here which perform the work perfectly from a mechanical and metallurgical point of view. The ore treated at the plant is generally found in small lenticular masses, intermixed with a gangue of sandstone. The process of separation and concentration is purely mechanical, consisting of the reduction of the broken masses of ore and gangue by passing them first through a jaw crusher, and secondly through a set of Cornish rolls. The lighter gangue of sandstone is then washed from the heavy ore by water, the process being assisted by passing the broken ore and gangue over jigs. Something like a fourth or a third of the broken material is saved in the form of high grade Bessemer ore. There is a large body of this mixed ore, lying in a conglomerate vein, and by means of an adit it is cheaply mined. The product is handled by gravity and the process requires a very small force of men.

In the Regent Group.

Preliminary to a resumption of mining operations in that shaft, which has been closed down for several seasons, the Steel Corporation has ordered extensive improvements undertaken at the Prince of Wales portion of the Regent group of mines at Negaunee, Marquette range. The changes to be made in the shaft will make it similar to the shaft at the Blue

and sister mine, through which all the ore produced by the group the past two years has been hoisted. The shaft, which at present is bottomed at 450 feet, will be put down to a depth of between 600 and 800 feet, and will be enlarged in dimensions besides. The size of the shaft now is 12 by 6 feet, and this will be increased to 16 by 6 feet so as to furnish accommodation for two skips, a ladderway and a compartment for the pump and steam pipes. It is expected that it will take three months' time with two shifts of men employed, to make the improvements.

The main, or hoisting, shaft at the Empire mine, which J. T. Jones of Iron Mountain is opening at Palmer, south of Negaunee, has been enlarged to accommodate two skipways and a ladderway, and at 125 feet it is close to the depth desired. The work of sinking a second shaft, or more properly a winze, is also under way. Ore will be blasted down into this, when mining operations are started, and will be caught in a chute beneath for hoisting to surface. The machinery now in use will be replaced by a larger and more modern hoisting plant as soon as the spur track which the Chicago & Northwestern Co. is building is completed to the mine. A crushing plant is to be installed consisting of three and perhaps more crushers of different sizes, which sizes, however, cannot be determined until a test is made of the ore. More men are gradually being taken on as room is made for them, and as soon as active mining is begun a much larger force will be given employment.

Lake Angeline Cave-in.

Considerable excitement was occasioned recently at the Lake Angeline location at Ishpeming by the caving in of a portion of the surface between that mine of the Jones & Laughlin Co. and the Steel Corporation's Section 16 property, the ground tumbling into an abandoned portion of the Lake Angeline workings. No great damage was done, but the accident narrowly escaped resulting seriously, a number of dwelling houses coming so close to being carried down as to cause the tenants to vacate the premises in haste. The opening is close to the D., S. S. & A. tracks leading to the Lake Angeline, and probably will necessitate their removal. About 300 feet south of the new opening, the ground has been caving for a number of years. It has several times been necessary to change the team road and sidewalk. The hoisting plant formerly in commission at Jones & Laughlin's East End Lake Angeline mine, where it has been replaced by engines of larger capacity, is to be removed to the Rolling Mill property at Negaunee, where the company is opening a new mine. The foundations for the machinery and the engine house itself, 80 by 80 feet in size, are now going in at the rolling mill, but it will not be until the greater part of the summer has passed that the plant will be in readiness for service there.

A local building concern is at work on a contract from the Steel Corporation calling for the construction of thirty dwelling houses at Ironwood, Gogebic range. The houses will be rented to miners in the employ of the company. Twenty-four of the dwellings will be four-room cottages, and the remainder six-room houses. They will be ready for occupancy early in July. Diamond drills operated by the Cleveland Cliffs Iron Co. are reported to have encountered ore on lands owned by J. M. Longyear of Brookline, Mass., west of Wakefield, Gogebic range. The location of the tract is such that it would not be surprising were a large ore body proved up, but it is not believed it would be a continuation of either the lenses at Wakefield or those at the Makado, a mile further west.

Ideas From Abroad.

The representatives of the Cleveland Cliffs Co. and other manufacturers of charcoal, used for fuel in furnace stacks, who recently returned from Europe after their investigation of methods of securing by-products from the charring of the wood, especially wood alcohol and acetate of lime, came back with a number of ideas of value. As one of the party says: "We have realized for some time that the process of extracting these products has been expensive in this country and that considerable waste is caused by the method in use here. The apparatus and plan of work in Sweden and Hungary are far in advance of those employed in America, and our purpose was to obtain pointers which could be adopted here. Our mission was very satisfactory, and we completed arrangements by which we will be able to utilize some of the methods in vogue across the ocean. We shall be able, with improved machinery, to increase the product from the same material at less expense than we are doing now."

Contracts have been awarded to the Hamilton (Ont.) Bridge Works for the construction of the Algoma Steel Co.'s open-hearth plant and it is expected that within six months this new department of the Lake Superior corporation will be in commission. The building housing the furnaces will be located alongside the present Bessemer plant at the Canadian Soo, and will be 200 by 110 feet in dimensions. The approximate cost of the installation will be $250,000. The capacity of the furnaces to be constructed this year will be about 200 tons a day, but the chief significance lies in the fact that the new department will make possible the use of a larger percentage of the company's own ore and also a large amount of scrap iron.

The Steel Corporation's Pioneer mine, on the Vermillion, has opened the shipping season with the largest stockpile since the property became a producer. It comprises more than 260,000 tons.

STEEL REPLACING IRON.

The decline of the finished iron trade and its supercession by the steel industry is one of the points most strikingly brought out by J. Stephens Jean, for one-third of a century secretary of the British Iron Trade Association, in his volume recently issued on the iron trade of Great Britain. In 1882 the world produced 9,680,000 tons of finished iron, and in 1902 the output was only 1,580,000 tons, Great Britain's share falling in that time from 2,841,000 tons to 965,000 tons. But the place of finished iron has been largely taken by steel; for whereas in 1882 only 7,000,000 tons was the extent of the world's production of steel, it is now more than 36,000,000.

A chapter on the iron-making conditions in other countries as compared with those in Great Britain explains the phenomenal growth of the iron and steel industries in the United States and Germany, and indicates, from Mr. Jean's point of view, how it is that Great Britain, which was first in importance in the manufacture of pig iron in 1880, now takes third place.

The question of "dumping" is discussed, and the author affirms that the agitation which has been carried on in Great Britain for some time against it has been partly founded on a more or less imperfect ascertainment of essential facts. An illustration of the conditions under which dumping is carried on is afforded by the experience of the German Wire Rod Syndicate, which comprises 82 works. In a recent six months they supplied 22,307 tons to home consumers, and on that made a profit of $293,280, while on the 19,524 tons exported there was a loss of $214,860. The German consumers were charged $62.40 per ton, whereas only $35 per ton was obtained for the quantity exported. In Germany there are at least 46 different syndicates in the coal and iron trades alone.

The three greatest combinations in the iron trade today are: The United States Steel Corporation, the German Steel Syndicate, and the International Rail Syndicate, which last has its headquarters in London, and controls an output of some 4,000,000 tons of rails annually in the United States, Germany, and the United Kingdom.

News of the Technical Schools.

University of Wisconsin.

Frederick E. Turneaure, dean of the College of Mechanics and Engineering, University of Wisconsin, announces the annual session of its summer school for artisans, which will open at Madison, June 25, and continue for a period of six weeks. This summer school was originated as an experiment with the idea of making its benefits as far reaching as possible, particularly to young men unable to pursue a regular engineering course. Its success dated from the start, and it has now been made a regular feature.

The instruction force is taken from the regular faculty of the college of engineering, and the entire laboratory and shop equipment belonging to the college are used by the students of the summer school. The requirements for admission do not extend beyond a working knowledge of English and arithmetic, but arrangements are so made that the student may take advantage of all the preparation he has attained. The school offers those unable to take a regular college course an opportunity of obtaining a working knowledge of the methods of testing and the use of instruments, together with such theoretical principles in each case as the preparation of the student will permit. It has been found of practical value to correspond with students seeking an opportunity for laboratory practice along the lines in which they have had only theoretical instruction. Courses of study include the following: engines and boilers, applied electricity, mechanical drawing and machine design, materials of construction, fuels and lubricants, shop work and manual training.

University of Washington.

Under the direction of Rolf Thelen, expert in charge, special work is going on at the United States Timber Testing Station, at the University of Washington, with the idea of removing what is thought to be an unjust prejudice in the east against the western hemlock (tsuga heterophylla) on account of its having been confused with the so-called eastern hemlock. The result is of great importance to the lumbermen of the west.

The University of Washington School of Mines recently installed a stamping mill and concentration plant as an addition to its equipment, which is the largest and most complete instructional plant in the country. The mill was installed through the agency of Milnor Roberts, dean of the school of mines, professor of mining at the University of Washington, and Prof. Richards of the Massachusetts Institute of Technology, with the two-fold aim of instructing students in ore dressing and the testing of ore sent in from various places in the northwest. The mill has a capacity of three-ton runs, which is of sufficient size to make the testing of practical value.

The machinery composing the new mill was furnished complete by the Allis-Chalmers Co., Milwaukee, Wis. The plan for operating the various appliances is as follows: On the stamp mill side, the ore is elevated by power hoist to bins leading to a Challenge feeder of the fixed suspended type. It is then fed into the three stamp mill proper, whose stamps weigh 300 lbs. each and drop ninety times per minute. The pulp from the battery flows over amalgamation plates through a mercury trap of the Black Hills pattern, and can be classified in a three compartment Browne hydro-

HARRY L. MEAD.

metric sizer. From the sizer it will flow to any of the following: Frue vanner with four-foot belt, sliming table, diagonal table or round slime table twelve feet in diameter. Pulp carrying fine gold will be run over canvas strakes fifteen feet long. Settling tanks will be provided to save slimes for later treatment by cyaniding or chlorination. A cyanide plant of 300 pounds capacity has already been installed. Copper, lead and zinc ores will fall from the bins through a Taylor roll-feeder to Cornish rolls, Allis-Chalmers style "C," belt driven. The crushed ore is screened to a revolving trommel, yielding three sizes, the medium size passing to the jigs and the coarse to the rolls or back to the jigs, varying with the character of ore, spacing of rolls, etc. The jig is a three compartment Hartz jig, built especially for the University mill. All products of the rolls and stamps can be turned to any of the concentrating tables, without elevating, and the vanner tailings can be run to either of the sliming tables. The power operating the plant is furnished by a 130 and a 66-horsepower motor. There is a full equipment of mining tools, coal mining drill, air drill, hammers, mine timbering tools, sampling floor, etc.

Harry L. Mead, E. M., has resigned as instructor of the school of mines of the department of geology to accept the position of mining engineer of the Meriden Iron Co., Hibbing, Minn., and to take charge of the field work connected with their extensive holdings of iron lands in the western part of that state. Mr. Mead attended the Armour Institute of Technology and in 1903 received the "Faculty" scholarship of the Columbia School of Mines and again the "Vanderbilt" scholarship in 1904. He graduated in 1905 and was elected to Sigma Xi.

Worcester Polytechnic Institute.

The contract has been let for the generator for the third unit for the service power plant at the Institute. This machine will be of two hundred kilowatts rated capacity, and will be manufactured by the Crocker-Wheeler Electric Co., of Ampere, N. J., after designs by C. E. L. Brown, of the Brown-Boveri Co., of Baden. The machine will be particularly interesting as an example of European design, although manufactured in this country.

Prof. Harold B. Smith has recently sold to C. S. Knowles of Boston, another of the 200,000 volt testing transformers which he has designed and built. This is the third of these remarkable transformers built by Prof. Smith, the preceding ones having been sold to the Locke Insulator Co., of Victor, N. Y., and to the New Lexington Porcelain Works, New Lexington, Ohio. These transformers are of very much higher potential than any others that have ever been built either in this country or in Europe.

Electric drives are being installed in the Washburn shops this spring for the purpose of running the machinery. The actual work of installation is in charge of two members of the senior class who have taken that as a subject for their thesis for graduation. It is expected that the installation of these motor drives will effect a considerable saving in power.

L. A. McCraw, '05, who has been with the Crocker-Wheeler Electric Co., of Ampere, N. J., has just accepted a position as instructor in electrical engineering at Cornell University. Mr. McCraw is the third Worcester Polytechnic Institute graduate to enter Cor-

nell as an instructor during the present year.

A contract has just been placed with the Ball Engine Co., of Erie, Pa., for one of their 500-horsepower, upright cross compound engines, for direct connection to the Crocker-Wheeler generator bought a few days ago, this to comprise the third generating unit of the new service power plant. The Ball engine will be 14 inches x 25 inches x 16 inches, will run at 257 revolutions per minute, and use steam at 150 pounds pressure.

The department of physics has received a valuable gift of meteorological recording instruments from two graduates of the institute, Wm. O. Green, '80, and Mr. Samuel M. Green, of '85. The set includes a Draper recording barometer, formerly the property of Mr. Andrew Green of Green Hill, (the "Father of Greater New York") which is presented to the institute by Mr. Wm. Green; a Draper recording thermometer and a Draper recording hygrometer, the last two instruments by a gift from Mr. Samuel M. Green. These instruments are of the most complete and valuable type of recording instruments.

George A. Throop, '97, who has been with Sanderson & Porter, New York, has just accepted a position with J. G. White & Co., of New York.

F. H. Richardson, one of last year's graduate student in electrical engineering, who, until recently has been with the Westinghouse Electric & Mfg. Co., at Pittsburg, has just accepted a position as instructor in electrical engineering at the McKinley Schools in Washington, D. C.

John Q. Barlow, '82, who is chief engineer of the Western Maryland railroad, is in charge of the engineering work in connection with the construction of the Uniontown & Wheeling short line.

Cornell University Personals.

'03, M. E. H. C. Carroll is erecting engineer with the Westinghouse Machine Co. His address is 171 La Salle street, Chicago, Ill.

'04, M. E. W. L. Glass is a draftsman with Westinghouse, Church Kerr & Co. His address is 512 Tenth street, Brooklyn, N. Y.

'05, M. E. E. Pomeroy Staats is an inspector in the engineering department of the N. Y. & N. J. Telephone Co. His address is 215 E. 15th street, New York city.

'05, M. E. John A. Baumgardner is in the experimental department of the Olds Motor Works, of Lansing, Mich. His address is 315 W. Allegan street.

'05, M. E. D. L. Bellinger is testing-floor foreman with the Gray Electric Co. His address is 211 Lafayette avenue, Brooklyn, N. Y.

MISCELLANEOUS PROPERTIES OF THE UNITED STATES STEEL CORPORATION.

From the fourth annual report of the United States Steel Corporation the American Iron and Steel Association has compiled the following information concerning the coking and steam coal lands, natural gas properties, railroads, and steamship lines owned or operated by the subsidiary companies of the United States Steel Corporation on Dec. 31, 1905.

Coking Coal Lands.—In the Connellsville and lower Connellsville districts in Westmoreland and Fayette counties, Pa., the subsidiary companies of the United States Steel Corporation owned 63,694 acres of coking coal land and 19,809 acres of surface land. They also owned 65 coke plants, with 18,257 bee-hive ovens. In the Pocahontas district of West Virginia they leased 50,000 acres of coking coal land and owned 36 acres of surface land. On these properties eight coking plants were in operation, with 2,062 completed bee-hive ovens. In addition 88 ovens were in course of construction. The subsidiary companies also had 357 by-product coke ovens at Benwood, W. Va., and at Sharon and South Sharon, Pa.

Steam Coal Lands.—The subsidiary companies owned at the close of 1905 in Washington, Allegheny, Somerset, Greene, and Fayette counties, Pa., 26,224 acres of steam and gas coal land. In addition they owned 6,500 acres of steam coal land at or near their furnaces, rolling mills, and steel works in Pennsylvania, West Virginia, Ohio, Indiana, and Illinois.

Natural Gas Properties.—The Carnegie Natural Gas Co., all the stock of which is owned by the Carnegie Steel Co., owned or operated under lease in Pennsylvania and West Virginia 114,852 acres of natural gas territory. It also owned 355 miles of pipe lines and four pumping stations. Extensive natural gas territory and pipe lines are also owned by the American Sheet & Tin Plate Co. in Pennsylvania, the gas from the wells being used at the company's plants in the Vandergrift district.

Railroads.—At the close of 1905 the subsidiary companies of the corporation owned or operated 814.58 miles of main line of railroad, 350.26 miles of branches and spurs, 215.83 miles of second tracks, and 541.60 miles of sidings; they also operated under trackage rights 297.69 miles of railroad; total, 2,219.96 miles.

Locomotives and Freight Cars.—The number of locomotives owned by the subsidiary companies of the corporation amounted to 690, the number of passenger cars to 103, and the number of freight cars to 31,632. Of the latter 3,110 were steel iron-ore cars, 4,475 were steel gondola cars, and 4,912 were steel hopper cars.

Steamships and Barges.—The fleet of the Pittsburg Steamship Co. was composed at the close of 1905 of 70 steel steamships and 30 steel barges. During the season of 1905, which extended from April 10 to December 12, the fleet carried 11,341,539 tons of iron ore and 557,825 tons of miscellaneous freight, a total of 11,899,364 tons. The gross earnings of the fleet during 1905 amounted to $8,972,441.16.

DISTILLATION OF IRON.

In a recent number of the *Comptes rendus de l' Academie des Sciences*, Moissan describes further experiments on the distillation of metals in the electric furnace. This investigator, who has already succeeded in distilling copper, gold, and the metals of the platinum group, has now turned his attention to iron and its allies. Manganese was found to be the most volatile metal of this series, a specimen containing 2 per cent of carbon readily distilled when heated with a current of 500 amperes and an E.M.F. of 110 volts. The distilled metal was distinctly crystalline. Another sample of this element free from carbon but containing 4 per cent of silicon was volatilized even more readily, but the ebullition was rendered irregular by the violent evolution of occluded gases. Nickel and chromium came next in order of volatility, about half a pound of the former distilled completely in nine minutes with 500 amperes and 110 volts. In the case of iron, an experimental difficulty arose owing to the molten iron carbide occluding gases and liberating these subsequently with considerable violence as the boiling point was reached, so that a large proportion of the metal was projected from the crucible. In this case the best result was obtained by heating the metal gradually with a current of 1,000 amperes and 110 volts, when 50 per cent of a 2-lb. specimen was volatilized in 20 minutes. The boiling point of uranium is somewhat higher than that of iron, a current of 900 amperes and 110 volts being required to volatilize this element. Molybdenum and tungsten were found to be the least volatile metals of the series and only boiled regularly after prolonged heating with the foregoing current. Like iron and manganese, molybdenum occludes gases when in the molten condition. Tungsten has the highest boiling point of any metal hitherto examined in the electric furnace.

Liquidating Movement Sends Prices Down.

The full force of the San Francisco disaster made itself felt on the stock exchanges during the past week In the days immediately following the horror, while its extent was as yet undetermined and uncertainty still prevailed as to the financial requirements for the relief and rebuilding of the ruined city, its effect in financial circles was not so sharp and powerful as might have been expected. The opening of the past week, however, saw these uncertainties largely cleared away; the extent of the disaster was known, relief measures were already making heavy demands upon eastern money centers and insurance companies were arranging their affairs for speedy payments. Partly because the resultant effect was already felt in some measure and partly in anticipation of what was certain to come, a liquidating movement started and soon assumed extensive proportions. Money rates were relatively high and exceedingly firm, making it more profitable to dispose of low-dividend securities than to carry them at current interest charges. The preparations of insurance companies for meeting their sudden obligations included the sale of immense quantities of first class securities and this movement was increased by the class of investors who saw a chance for better returns from the use of their money in the stricken city. The result of these combined tendencies, together with continued unfavorable developments in the coal situation, was to send prices to the lowest level of the year. The average decline of the week was about eight points, though Great Northern was off 34 points and Northern Pacific 21. Three securities sold in excess of 1,000,000 shares; Reading, 1,578,000, with a net decline of eight points, Union Pacific, 1,107,700, with a similar loss, and Steel preferred and common, 1,057,700, with an average loss of four points. Manufacturing securities were comparatively little dealt in and as a rule held their own fairly well.

FINANCIAL NOTES.

Recent dividend declarations include the following: American Radiator, regular quarterly, 1¾ per cent on preferred, payable May 15, and 1 per cent on common, payable June 30; Pressed Steel Car, regular quarterly, 1¾ per cent on preferred, payable May 23; Shelby Iron Co., usual semi-annual divided of 5 per cent, payable May 15. The dividend recently declared on preferred by United States Steel is payable May 31.

The Barney & Smith Car Co. has elected to redeem its $1,000,000 outstanding first mortgage bonds at 110 and interest. The Guaranty Trust Co., New York, will make payment on and after June 30.

Colorado Fuel & Iron securities claim attention for their violent fluctuations this year. During the January boom this stock went to 83; the liquidating movement of the past few days sent it to 47.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quotation April 21	Closing Quo. April 28	Changes	Date of 1906 Ann. Meet.	Par Value	Capital Outstanding	Dividend Basis	Dividend Being Paid	Dividend Date Last Div. Dec.
Allis-Chalmers Co	22	20½	−1½	Sept.	100	19,820,000			
Allis-Chalmers preferred	56½	55⅜	− ⅞		100	16,150,000	7 cum		Feb., 1904
American Can	8⅝	7⅝	− ⅞	Apr. 24	100	41,233,300			
American Can preferred	61¼	60	−1¼		100	41,233,300	7 cum	5 Q.	Apr., 1906
American Car and Foundry	42⅞	38¼	−4⅝	June 28	100	30,000,000			May, 1905
AmericanCar and Foundry preferred	102¼	101	−1¼		100	30,000,000	7 n. c.	7 Q.	Jan., 1906
American Locomotive	68⅛	59⅜	−8½	Oct. 16	100	25,000,000			
American Locomotive preferred	114⅛	111½	−2		100	24,100,000	7 cum	7 Q.	Apr. 1906
American Shipbuilding	56	55½	− ½	Oct. 2	100	7,600,000	4	4 Q.	Apr., 1906
American Shipbuilding preferred	107½	106	−1½		100	7,900,000	7 n. c.	7 Q.	Jan., 1906
American Steel Foundries	11⅝	10¼	−1¾	Oct. 3	100	17,700,000			
American Steel Foundries preferred	45	43	−2		100	17,700,000	6 cum		Aug., 1905
Barney & Smith	65	65	.....	June 5	100	1,000,000			June, 1894
Barney & Smith preferred	140	140	.....		100	2,500,000	8 cum	8 Q.	Mch., 1906
Bethlehem Steel	27⅛	25⅝	−1½	April 3	100	15,000,000			
Bethlehem Steel preferred	87⅞	85	−2⅞		100	15,000,000	7 n. c.	7 Q.	May, 1906
Bullock Electric preferred	111	111	.....	Oct. 2	100	1,000,000	6	6 Q.	Jan., 1906
Cambria Steel	35¼	33¼	−2	March 20	50	45,000,000	6	7 Q.	Mar., 1906
Cambria Iron	49⅝	49⅞	.....		50	8,468,000	4	4 S. A.	Apr., 1906
Colorado Fuel & Iron	61⅛	46	−15⅛	Oct. 15	100	30,132,000	7	.....	Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	20	20	.....	May 31	100	6,098,000	5	.....	Nov., 1902
Crucible Steel	14½	13	−1½	Oct. 17	100	25,000,000			
Crucible Steel preferred	80¼	78	−2¼		100	25,000,000	7 cum	.....	Sept. 1903
Empire Steel	7	7	.....	Feb. 28	100	2,281,400			
Empire Steel preferred	40	35	−5		100	2,500,000	6 cum	3 S. A.	Jan., 1905
Fay & Egan	93½	93½	.....	Feb. 20	100	1,000,000	5	5 Q.	Nov., 1905
Fay & Egan preferred	128½	128½	.....		100	1,000,000	7 cum	7 Q.	Nov., 1905
General Electric	169⅛	162⅝	−6½	May 8	100	48,256,050	8	8 Q.	Jan., 1906
International Pump	48½	46	−2½	June 5	100	12,262,500		2	July, 1905
International Pump preferred	83¼	83	− ¼		100	8,850,000	6 cum	6 Q.	May, 1906
Lackawanna Steel	71	71	.....	March 14	100	34,971,400		.....	
Lake Superior Corporation	19½	19	− ½	Oct. 3	100	40,000,000		.....	
Niles-Bement-Pond	130	130	.....	Feb. 7	100	5,000,000	6	6 Q.	Feb., 1906
Niles-Bement-Pond preferred	105	105	.....		100	2,000,000	6 cum	6 Q.	Mch., 1906
Otis Elevator Co	54	55	+1	March 19	100	6,350,300		2 A.	Apr., 1905
Otis Elevator Co. preferred	100	100	.....		100	5,589,500	6 n. c.	6 Q.	Apr., 1906
Pittsburg Coal Co	17¼	14	−3¼	Feb. 12	100	30,135,000		.....	
Pittsburg Coal preferred	57¼	55⅝	−1⅝		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	54⅞	47⅛	−7¾	Feb. 21	100	12,500,000		3	Aug., 1904
Pressed Steel Car preferred	99½	97	−2½		100	12,500,000	7 n. c.	7 Q.	May, 1906
Pullman Palace Car	236¼	220¼	−16	Oct. 18	100	74,000,000		8 Q.	Feb., 1906
Railway Steel Spring	55	49¾	−5¼	March 1	100	13,500,000		4 S. A.	Oct., 1905
Railway Steel Spring preferred	103	100¼	−2¾		100	13,500,000	7 cum	7 Q.	Apr., 1905
Republic Iron & Steel	30¼	25¼	−5	Oct. 17	100	27,352,000		.....	
Republic Iron & Steel preferred	102¼	94⅛	−8⅛		100	20,852,000	7 cum	7 Q.	
Sloss-Sheffield	80⅜	73⅜	−7	March 14	100	7,500,000	5	5	Apr., 1906
Sloss-Sheffield preferred	112¾	110	−2¾		100	6,700,000	7 n. c.	7 Q.	Jan., 1906
Tennessee Coal & Iron	145	139	−6	May 15	100	22,552,800		4 Q.	Jan., 1906
U. S. Cast Iron Pipe & Foundry	49⅞	45⅝	−4¼	June 27	100	12,500,000		2	Apr., 1906
U. S. Cast Iron Pipe & Foundry preferred	94⅜	92¾	−1⅝		100	12,500,000	7 n. c.	7	June, 1906
U. S. Steel	43½	39¼	−4¼	April 16	100	508,302,500			June, 1906
U. S. Steel preferred	108¼	103	−3¼		100	360,281,100	7 cum	7 Q.	Dec., 1903
U. S. Steel 5's	99⅞	99⅜	− ½		100	463,798,000	5	5 A.	Feb., 1905
Virginia Iron, Coal & Coke	46½	40	−6½	Sept. 18	100	8,641,600		.....	
Westinghouse Electric	156	150	−6	June 27	50	20,996,350	10	10 Q.	
Westinghouse Air Brake	150	150	.....	Oct. 2	50	10,990,450	20	20 Q.	Apr., 1906
									Apr., 1906

NEWS FROM MANY INDUSTRIES.

New Buyers:—

The James J. Lacy Co., 1401 Block street, Baltimore, Md., has been incorporated for $50,000 to manufacture iron and steel castings, patterns and other iron and steel work.

The Penn-Garrett Coal Mining Co., Friendsville, Md., is being organized with a capitalization of $100,000 to develop coal lands and manufacture coke. De Warren H. Reynolds, Cumberland, Md., is attorney for the company, others interested being Robert McCandish, C. B. Guard and Walter M. Savage.

The Keokee Coal & Coke Co., in which C. B. Perin, 71 Broadway, New York, is interested, will develop coal lands near Crab Orchard, Va. Besides Mr. Perin the directors are: R. Stuyvesant Pierrepont, R. Pentleton Bowler and W. L. Webb, of New York; Richard W. Hale, of Boston; Julian Kennedy, of Pittsburg and C. T. Boynton, of Chicago.

The Pennsylvania Foundry Co., of York, Pa., has been formed by C. F. Spinney, formerly connected with the Maryland Steel Co., and Frank F. Baugher, an experienced patternmaker and foundryman. They have secured a building, remodeled it for foundry purposes and added pattern shop and other necessary departments. Small castings will be made and wood and metal patterns manufactured.

The Canton Bridge Co., No. 15 Exchange Place, Jersey City, N. J., has been incorporated with a capital stock of $25,000 to manufacture machinery, engines, cars, etc., and to construct bridges. The incorporators are: John R. Turner, No. 15 Exchange Place, Jersey City; Peter L. McGrail and Grove E. Johnson, Groton, N. Y.

The East Tennessee Coal & Lumber Co. has been chartered with a capital stock of $2,500,000, to operate mines, to manufacture iron, steel, coke, etc. The incorporators are: Webster Blocker, No. 41 Wall street; Stacy R. and Ellridge F. Hill, No. 154 Nassau street, all of New York; Lucius P. Wilson, Flushing, L. I.; and Franklin Henshaw, Scranton, Pa.

The Augustine Rotary Engine Co., incorporated with a capital stock of $100,000 will manufacture boilers, engines, machinery, etc. The incorporators are: Benjamin R. and A. C. Augustine and Alman W. Lytle, all of Buffalo, N. Y.

The Chas. E. Miller Co. has been incorporated to carry on forging, mining and smelting. The capital stock is $6,400 and the incorporators are: Charles E. Miller, Hotel Churchill, 14th street and Broadway, N. Y.; Maurice Zuckerman, No. 244 East Fourth street; and Jacob Jacobs, No. 642 East 14th street, all of New York.

W. E. Coyan, Homestead, Pa., is organizing a stock company to manufacture a new armor faced rail which he recently patented. His process is such that the head and face of a rail are given four chillings and four reheatings for tempering and hardening purposes.

The Dobbins Furnace Co., Marshall, Mich., has been incorporated with a capital of $25,000 by J. L. Dobbins, A. B. Wagner, G. M. Barrett, J. M. French, E. A. Hoeltzel and Geo. E. Chapin, of Battle Creek. The new company will take over the plant of the J. L. Dobbins Furnace Co., and will manufacture hot air furnaces, etc.

The Hamilton Foundry & Machine Co., Hamilton, O., has increased its capital stock from $25,000 to $150,000.

The Bennett Steel Furnace Co., Cincinnati, has been organized with a capitalization of $25,000 by Henry Binkhold, Charles H. Bennett, S. W. Loomis, Charles T. Wolff, C. C. Bishop and Ed. D. Woodward.

The Enterprise Brass Foundry Co., Seattle, Wash., has been incorporated with a capital stock of $6,000 by Frank L. Baker, Eugene Thurlow and John Carey.

The Henderson Machine Co., Henderson, Ky., has been organized with a capitalization of $20,000 by R. T. Hickman, Ike Loeb, Leslie Hite and J. F. Hite, all of Henderson.

The Detroit Motor Casting Co., Detroit, Mich., has been incorporated with a capital of $2,500 by F. G. Skinner, R. R. Sterling, E. J. Roney, J. C. Danziger, J. Roney and Geo. W. Bowe.

The Florence Iron Works, Florence, Wis., has been incorporated with a capitalization of $100,000. The incorporators are: Edward Thieman, H. L. Chamberlain and Max Sells.

The Des Moines Gas Engine & Electric Co., Des Moines, Ia., has been reorganized under the name of the Monarch Machine Co., with a capitalization of $50,000. The incorporators are: W. G. DuMont, C. J. Bristol, and W. G. Sanford. The company will manufacture and install gas engines and similar machinery.

The Perfect Supply Co. will manufacture fittings for boilers, engines, etc. The capital stock is $1,000 and the incorporators are: J. S. Albright, W. J. Richter and E. E. Baunwart, all of Rochester, N. Y.

New Construction:—

The Atha Steel Casting Co., Newark, N. J., recently incorporated to take over the plant and business of Benj. Atha & Co., began active operations May 1. Extensive additions to the plant are now in progress. The new company is adding six bays to be constructed of steel with concrete side walls and roof, each approximately 50 feet wide and 209 feet long. The first bay will contain three 25-ton open-hearth furnaces, which are to be served by a Wellman charging machine and also by an electric traveling crane; the second, third and fourth bays will be used for molding and pouring; the fifth for cleaning and chipping, and the sixth for a machine shop for rough finishing. The foundry bays will be equipped with 40-ton traveling cranes and the machine shop with a 50-ton crane so that it will be capable of handling castings of that weight. A producer building for 60 producers and a pattern storage is also being erected of steel and concrete throughout, consequently fireproof. The entire foundry, the old portion as well as the new, will be equipped with sand conveyors and other modern machinery. The present output of the plant is about 1,500 tons every month; this will be increased to 3,000 when the additions are completed. The new company will continue in the lines of the old, making a specialty of railroad castings and castings for electrical purposes.

The Buckeye Steel Castings Co., Columbus, O., during the summer will add a fifth furnace to its South Parsons plant, increase the capacity of the power plant, add a new crane and install other equipment enabling it to use all available space in the present buildings. Operations of the company have been centralized at the South Parsons plant and the former quarters on Russell street are for sale or lease.

The Whiting Foundry Equipment Co., Harvey, Ill., a suburb of Chicago, is erecting a new pattern shop 44 x 96 feet, and an addition 52 x 130 feet to the machine shop. The latter will give additional shipping facilities by permitting two tracks to run through the shops and will contribute to the running of electric traveling cranes and equipment of heavy capacities. These new improvements have been made necessary by the steadily increasing business of the company.

The National Fire Brick Co., Strasburg, O., one of the Ohio plants of the Stowe-Fuller Co., Cleveland, is installing a new 400-horsepower engine, four

30-foot kilns, and a building affording 20,000 square feet of additional drying floors. The plant, which has been shipping 300 tons of fire clay material daily, will soon be increased to an output of 400 tons per day, which will make its capacity the largest of any fire brick works in the country. The National plant has run for the past five years without a stop. Its product has found special favor for blast furnace stoves and general steel plant work. The increase in its demand necessitates the present improvements.

The Emporia Machine Co., Emporia, Va., will erect a number of small buildings to replace the plant recently destroyed by fire.

The Marion Mfg. Co., Marion, Va., is considering the enlargement of its main factory building. It is soon to erect an engine room and machine shop 40 x 120 feet.

The Virginia Bridge & Iron Co., Roanoke, Va., is to erect a fireproof structure to replace the bridge shop which was recently burned.

The Odin Stove Mfg. Co., Erie, Pa., is shortly to build a foundry 55 x 165 feet, and make a number of small additions to its plant.

The Western Electric Co., Chicago, has let contracts for a portion of the work on its woodworking shops, to be built at Hawthorne. The main building will be five stories, 255 x 375 feet, and will cost $650,000.

The contract for a four-story office building of the Bethlehem Steel Co., Bethlehem, Pa., has been let to Herbert E. Havens & Co., Philadelphia. The building will be 135 x 160 feet of fireproof construction with an ornamental brick and terra cotta front and will cost about $200,000.

The Smith Machine Co., Milwaukee, Wis., is preparing plans for a brick and concrete machine shop 100 x 260 feet to cost about $25,000.

The J. G. Brill Co. is shortly to erect a structure 68 x 163 feet, as an addition to its plant at Philadelphia. It will be used as a spring factory.

The plant which the Kennedy Valve & Construction Co., 25 Beekman street, New York, is to erect at Elmira, N. Y., will consist of seven buildings of brick, steel and concrete construction, at a cost of over $300,000. A site of 20 acres has been secured.

The Middletown Car Works, Middletown, Pa., it is reported, will erect a steel factory building 70 x 250 feet, and an office building. The estimated cost is $100,000.

The Singer Sewing Machine Co. has under construction at St. Johns, Que., a branch factory which when completed will cost about $1,500,000. It will be the largest plant of its kind in Canada, covering 37 acres and employing 1,400 men. Most of the construction materials are being purchased in the United States.

The Centaur Iron Co., Des Moines, Ia., has let the contract for a new factory building. The company manufactures ornamental iron work, standpipes, fire escapes, etc.

James A. Moore, of the Northwestern Iron & Steel Co., recently organized, announces that the plant will be located at Seattle without a doubt. A free site has been offered, but a number of sites are under consideration. A definite decision has not yet been reached.

The Bristol Stove & Foundry Co., Bristol, Va.-Tenn., has completed its plant. This includes a casting room 60 x 100 feet, mounting room 50 x 75 feet, warehouse of the same size and boiler house.

The Northwestern Iron Co., Milwaukee, Wis., is adding a 300-ton blast furnace to its plant at Mayville, Wis. Pig handling and breaking machinery will be installed and five Allis-Chalmers engines will comprise the power plant.

The Baldwin Steel Co. has plans completed for the plant which it is to locate at Charleston, W. Va. The main building will be about 120 x 400 feet, with a power house 40 x 80 feet. A 10-inch mill and a 13-inch mill will be installed, together with two crucible steel furnaces, and 11 heating and annealing furnaces.

The Seaboard Bridge & Structural Steel Works, recently incorporated, is to erect a plant at Jersey City, N. J., for the manufacture of structural steel in unusual sizes and shapes. A concrete and steel building 100 x 300 feet will be erected besides a smaller office building. The plans are in the hands of George Nichols, 41 Wall street, New York.

The Hill Clutch Co., Cleveland, is preparing plans for a new foundry 120 x 226 feet, with a 40 x 75-foot L. Equipment will include a cupola and three cranes.

General Industrial Notes:—

The Dallas City, Ill., branch of the Reliance Foundry Co., has bought a plant at Ft. Madison, Ia., employing about 75 men, and will operate it on stove plates, light machinery and structural and heavy machinery work. Two cupolas will be operated in two departments for specializing heavy and light work. Complete machine equipment will be installed for handling all classes of work, and also for entering the wood and metal pattern business.

The Standard Steel Car Co., of Pittsburg and Butler, Pa., has purchased the old tube mill at New Castle, Pa., and an adjacent site from the Hanover & First National Bank, of New York. The works will be refitted at once for the manufacture of steel cars and probably 500 men will be employed at the plant within a short time.

An electric securities corporation, now being organized, is to take over the steel plant of Westinghouse, Church, Kerr & Co., of New York. John F. Wallace will be president, and the Westinghouse interests will be important stockholders. This corporation will conduct a general engineering and construction business through Westinghouse, Church, Kerr & Co., and will also make investments in enterprises involving the use of electricity.

The McFarland Foundry & Machine Co., Trenton, N. J., which was recently incorporated, has taken over the business started by William McFarland who at the time of his death, some five or six years ago, enjoyed a wide reputation as a manufacturer of cast chilled wire drawing dies. The five year lease on the plant recently expired, and it was purchased by the new corporation which will probably make some extensive additions to the gray iron foundry and machine shop at an early date. James J. Wilson is president, F. M. Stable, secretary and Louis C. Taylor, treasurer.

The Avonmore Cast Steel Co. will have the plant at Avonmore, Pa., recently acquired, in operation within the next week. The converter or baby Bessemer process will be employed and the limit of capacity of single casting will be about 5,000 pounds.

The Crown Pipe & Foundry Co., Jackson, O., recently occupied its new building which gives it a total floor space of 196,000 square feet. It manufactures the "Crown" brand of soil pipe and fittings, and has a daily capacity of five cars. A fire-proof pattern room was recently completed and the old pattern room was fitted up as a machine shop. An electric plant will shortly be installed for power and lighting purposes.

The Sterling Coal & Coke Co., Uniontown, Pa., recently incorporated, has organized by electing W. C. Magee, Pittsburg, president; George Whyel, Uniontown, vice president and general manager; and I. W. Seamans, Uniontown, secretary and treasurer. The company expects to have its 300 ovens completed by Oct. 1. Its entire output will be handled by the Pickands-Magee Coke Co., Pittsburg.

The plant of the O'Connell Coal & Coke Co., Uniontown, Pa., has been purchased by W. A. Stone, who has also bought 150 acres of coal in that

section, it is stated, at $1,300 an acre. He will increase the capacity of the coking plant from 35 to 150 ovens and will organize a new company with a stock of $200,000; other Uniontown men will be interested.

The Gilmore Coke Co., Uniontown, Pa., has purchased at $2,800 an acre a tract of 61 acres of coal in Georges township, adjacent to the company's present holdings. The land belonged to James A. Smith and the price is said to be the highest ever paid in the coke region.

The plant of the Louisville Bolt & Iron Works, Louisville, Ky., will be sold at auction May 16. The machinery is in good condition and the plant practically in shape for operation.

The consolidation of the West Virginia Bridge & Construction Co., Wheeling, and the New Jersey Bridge Co., Manasquan, N. J., has been completed. The capital stock of the consolidated company, which takes the name of the former, is $500,000, and its combined capacity to be 3,000 tons monthly The officers of the company are as follows: F. M. Peet, president; Edward Hazlett and Charles F. Paxton, vice presidents; F. M. Wyant, treasurer, and T. H. Thomas, secretary.

Sundberg, Kropp & Co., Chicago, have leased the foundry property at 1121-1125 West Twenty-first street, Chicago.

Fires:—

The plant of the Vilter Mfg. Co., Milwaukee, manufacturing Corliss engines and refrigerating machinery, sustained a loss of about $50,000 by fire April 21. A large number of patterns were destroyed along with the offices and machine shop.

The Ashtabula Mfg. Co., Ashtabula, O., maker of hinges and hardware specialties, lost its plant by fire April 27. The American Snap Co., occupying part of the factory building, also shares in the loss which will be about $40,000.

The offices of the American Bridge Co. in the Union Trust building, San Francisco, were completely burned out. The structure will be repaired at once when the company expects to occupy its old quarters. Milliken Bros., Inc., have opened temporary offices in Oakland. Its offices in the Rialto building were completely wrecked although the framework of the structure which was erected by this New York firm suffered comparatively little injury.

The American Screw Co., Chicago, was a heavy loser by fire April 26, when the five-story building which it occupied jointly with the E. J. Cady Co. was destroyed.

The foundry of O'Brien Bros., Columbus, O., caught fire from an overheated cupola April 25 and was damaged considerably.

Trade Notes:—

The G. H. Williams Co., Cleveland, reports orders for clam shell buckets numerous. Mr. Williams, of this company, recently secured an order for a three yard clam shell bucket from the Heyl & Patterson Co., Inc., Pittsburg; a two yard bucket was recently delivered to the Glover & Stevens Co., Cleveland, and some six or eight more are being constructed.

The Ball Engine Co., Erie, Pa., reports a number of recent orders for its product including: Fruit Growers' Refrigeration & Power Co., Anna, Ill., one 200 horsepower engine; Central Ice Co., Mounds, Ill., two 150 horsepower simple engines; National Tube Co., Pittsburg, Pa., one 700 horsepower cross compound Corliss engine; Burnham Bros., Milwaukee, Wis., one 60 horsepower simple engine; Oliver Mining Co., Hibbing, Mich., four 100 horsepower single cylinder engines; James W. Ellsworth & Co., Cleveland, O., two 400 horsepower simple engines; Erie County Electric Co., Erie, Pa., one 70 horsepower center crank engine; Norristown Electric Light & Power Co., Norristown, Pa., one 400 horsepower single cylinder engine; Worcester Polytechnic Institute, Worcester, Mass., one 350 horsepower vertical cross compound engine; Young & Summers, Lima, O., one 350 horsepower horizontal cross compound engine.

The American Skein & Foundry Co., Columbus, O., reports business is the heaviest in its history. Orders on its books insure a long run and a number of improvements are contemplated to accommodate them.

The Pickands-Magee Coke Co., Pittsburg, announces the removal of its office to the Frick building annex, thirteenth floor. It also announces the completion of the southern Connellsville plant, doubling its capacity in all grades of Connellsville coke, running regularly high in carbon and low in sulphur and ash. An independent laboratory has been established at Uniontown for daily analysis, which will prove a valuable feature to users of this coke.

The Canadian Westinghouse Co., Ltd., has secured a contract from the Montreal Street Railway Co., for 20 quadruple equipments of 50 horsepower railway motors complete with controllers and details. Also a 1,500 horsepower, 600 volt, direct current engine and three 750 horsepower three bearing motor generator sets.

TRADE PUBLICATIONS.

R. D. Wood & Co., have issued a catalog on high grade centrifugal pumping machinery. The catalog consists of 110 6 x 9 pages, and is replete with useful information regarding this type of pump. The information includes a glossary of terms relating to the subject, a short article on the general principals of pattern priming and priming devices and classifications, together with a table of economical ratings. Construction of standard and special pumps are taken up and described. A valuable feature is a chart in colors showing the capacity, lift, efficiency and power of pumps, and in addition to these features, a large number of formulae and tables applicable to pumping machinery are included.

The Ingersoll-Rand Co., has issued catalog R 37, which is devoted to Rand air and gas producers. The catalog consists of about 125 6 x 9 pages, and is plentifully illustrated with installations of various types of machines. The principal dimensions and capacities of the various classes of machines are given in the form of tables, and directions for setting and operation are included. A valuable feature of the catalog is a short article upon the flow of compressed air in pipes, in which a number of valuable tables are incorporated. Other information given is the air required for hoisting rock at various angles of slope, effective pressure and horsepower developed in compressing air and a table of the flow of air through orifices.

A. E. Hoermann, 41 Park Row, New York city, is distributing in the eastern states a catalog of the Pilling Air Engine Co., of Detroit, which company he represents. This catalog shows pneumatic motor hoists, pneumatic engines with various applications and also the pneumatic turn table device.

The Expanded Metal & Corrugated Bar Co., St. Louis, Mo., has recently issued a comprehensive catalog devoted to concrete construction. The book comprises 230 3 x 7 pages and is plentifully illustrated. A large number of applications of concrete work are taken up and described and illustrated. The illustrations include buildings of various characters, retaining walls, floors, bridges, roofs, etc. The last 100 pages are devoted to a mathematical discussion of reenforced concrete beams, the properties of concrete, formulae for mixing and a large number of tables giving data for use in concrete construction. The catalog is an exceedingly useful publication.